Niagara Peninsula Transportation Needs Assessment Study

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Niagara Peninsula Transportation Needs Assessment Study

Executive Summary Report

MESSAGE FROM THE MINISTER

Ontario's transportation system continues to drive Ontario's economy forward into the 21st century.

A safe, efficient and integrated transportation system supports economic investment, promotes job creation, and contributes to the preservation of the environment and the overall quality of life for all residents of the Province of Ontario.

MTO is taking the steps necessary to plan for the future of transportation in Ontario. Long-range transportation planning is underway across the province in support of the government's made-in-Ontario Smart Growth commitment to build a stronger economy, stronger communities and a healthy environment.

MTO is working closely with the Ontario SuperBuild Corporation, leading the largest infrastructure building program in Ontario's history, to develop new and innovative financing and public/private partnership approaches to create new infrastructure to meet Ontario's transportation needs over the next 30 years.

The Niagara Peninsula Transportation Needs Assessment initiative is a comprehensive transportation study that provides a multi-modal Transportation Development Strategy - a "road map" to guide transportation investment in the broader Niagara – Hamilton area.

This Transportation Development Strategy needs to support international trade and tourism, provide transportation choice, and encourage growth away from Niagara Region's unique tender fruitlands and the Niagara Escarpment.

MTO recognizes the importance of developing a vision for tomorrow's transportation system in concert with other levels of governments. Over the course of the study, MTO partnered with the Regional Municipality of Niagara and the City of Hamilton; and consulted with Halton Region and Haldimand County. Through this unique provincial-municipal partnership, a vision has been created to realize provincial and regional planning and economic development goals.

The Niagara Transportation Needs Assessment, and other similar initiatives under way across the Province, will give us a strong, competitive edge, as we strive to build an even stronger economy.

The Niagara Peninsula

The Niagara Peninsula area, strategically located within central Ontario, acts as an international trade and tourism gateway between the Greater Toronto Area, and southwestern Ontario and the United States. Some 120 million people and major markets lie within 500 kilometres of the Peninsula. International trade and goods movement through the peninsula into Canada's economic heartland are critical to the regional, provincial and national economies.

The Regional Municipality of Niagara itself is part of a unique, bi-national region spanning the Niagara River. With four road bridge crossings and several large tourist attractions, the Niagara area is both a major tourism gateway, and a vital tourism growth centre in Ontario.

The City of Hamilton is also in a unique position, functioning as a gateway between the Niagara area and the Greater Toronto Area (GTA). A number of key highways link Hamilton to Niagara and Halton Regions, Haldimand County and the Kitchener-Cambridge-Guelph areas.

Exhibit 1: The Niagara Peninsula Area

The Niagara Peninsula Area

The efficiency of the provincial highway system, in and through the Niagara Peninsula is therefore essential to the continued economic prosperity of the broader Golden Horseshoe area.

The QEW is the primary artery for trucks, tourists and commuters through the Niagara Peninsula, linking local communities, industry and markets. The QEW is situated along the north side of the Niagara Escarpment in a narrow corridor that is also home to both a substantial number of people and tender fruitlands. These different land uses are competing for limited space. At the same time, the unique soil and climate conditions make the tender fruitlands a valuable and irreplaceable resource in Ontario.

Border Crossings

The Peace Bridge and the Queenston-Lewiston Bridge are the Niagara frontier border crossings, and are the only bridges along the Niagara Frontier that are open to trucks. Over the period 1995 to 2000, Peace Bridge truck volumes rose by 26 per cent to 1.4 million vehicles annually, while the Queenston-Lewiston Bridge truck traffic increased by 32 per cent to just over 1 million vehicles during the same period. The long-term viability of the international crossings and the provincial highway system through the Niagara Peninsula is important to continued trade, tourism and economic growth and prosperity in the region and the broader Golden Horseshoe area.

Trade

International trade with the United States is crucial to the economy of Canada and Ontario. Canada and the United States enjoy the largest bi-national trading relationship in the world, at about $590 billion in 2000. Approximately 87 per cent of Canadian exports and 93% of Ontario's exports go to the U.S. Total exports from Ontario accounted for 53 per cent of provincial Gross Domestic Product (GDP) in 2000 compared to 29 per cent in 1989 and support 1.6 million jobs. Increases in exports during the past four years account for 20 per cent of Ontario's economic growth. Rising productivity, the low value of the Canadian dollar and government fiscal policy have supported Ontario's global competitiveness, export growth and job creation.

The Niagara Peninsula is a key economic trade corridor connecting the eastern U.S. seaboard and north-eastern U.S. industrial centres to the GTA, Kitchener-Waterloo and southwestern Ontario. The Niagara frontier plays a significant role in this trade, as about 16% of all Canada-U.S. trade moves through the Peninsula to cross the border.

The QEW is a primary truck route linking the Niagara bridge crossings to the Greater Toronto Area (GTA) and the rest of southern Ontario. On an average workday, 15,000 trucks travel the QEW through Stoney Creek, hauling approximately $390 million in goods.

Tourism

Tourism is currently Ontario's fifth largest export industry and is projected to become the fourth largest in the near future. Of the $47.3 billion (1998) of tourism spending in Canada, $11.5 billion was spent in Ontario. Expenditures in Niagara and Toronto were about $2.1 billion and $2.8 billion respectively.

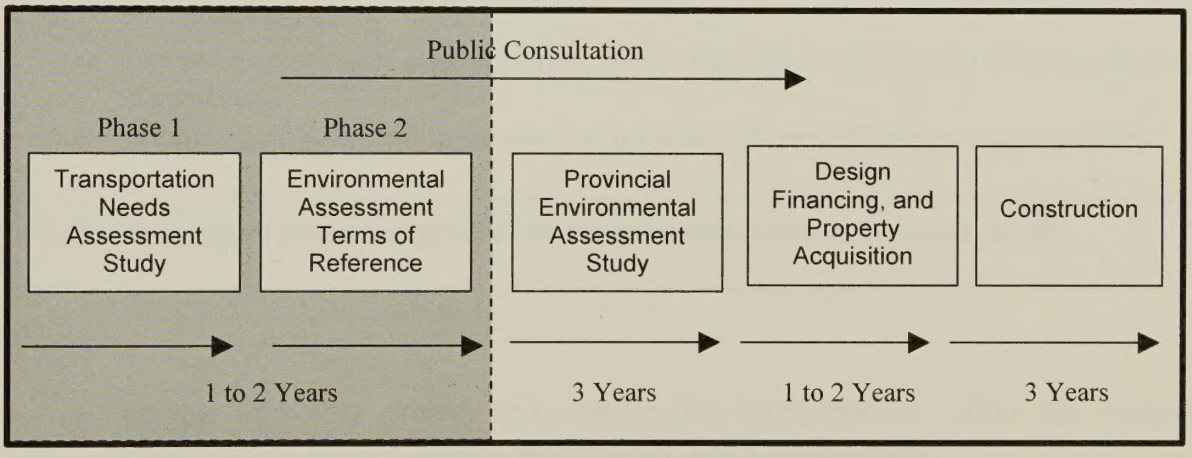
Niagara is Ontario's primary tourism gateway, with over 50% of tourists entering the province via the international crossings. Over 90% of tourists entering Ontario travel by auto.

Transportation Needs Assessment Study

The Niagara Peninsula Transportation Needs Assessment Study is a component of the Ministry of Transportation's strategic long-range transportation planning program to improve transportation through Ontario's major international gateways and key highway corridors.

Long-range planning is critical to ensure that transportation investment is made where required, when needed, and in the most cost-effective way. Transportation Needs Assessment Studies play a critical role in this process, but represent only the first step in a longer implementation process. It can take between eight and ten years to plan, design and build new highways. Clearly, "smart-planning" is necessary to ensure that such costs, time and resources are wisely invested.

Transportation Planning Process



A Transportation Needs Assessment Study is primarily a technical exercise to determine the need and justification for transportation improvements and the feasibility of various transportation alternatives. It is a precursor to the formal environmental assessment process for major transportation infrastructure such as new highways or major extensions to existing highways. Needs assessment studies may be considered as doing our "homework", to determine what action, if any, should be initiated prior to undertaking costly and time-consuming environmental assessment studies. During this phase, the ministry works with municipal stakeholders and consults with transportation providers, agencies and other stakeholders.

In the event that a new highway or major extension is recommended, the Ministry begins Phase 2, which involves public consultation on the technical findings of the needs assessment study and development of a Terms of Reference for an Environmental Assessment (EA) Study. The Terms of Reference outline the purpose, scope and

consultative process for the EA study. It is subject to public review and Ministry of the Environment approval.

Depending on the project, there may also be a need for Federal approvals under the Canadian Environmental Assessment Act.

Study Goals and Objectives

Building upon the *Provincial Policy Statement* and the government's *"Smart Growth"* principles, the following Goals and Objectives were established for the Niagara Peninsula Transportation Needs Assessment Study.

Goal: To create a Transportation Development Strategy that provides a safe, efficient, effective and reliable transportation system.

Objectives

- Move people and goods more efficiently through the Niagara Peninsula, by minimizing delays and reducing congestion.
- Maximize use of existing infrastructure and resources at both a provincial and municipal level.
- Expand and enhance transportation choice through consideration of transportation alternatives.
- Promote technological innovation to improve system efficiency and reliability.

Goal: To support economic growth at the provincial and municipal levels.

Objectives

- Sustain economic growth and position the municipalities within the Niagara Peninsula to compete locally, provincially and internationally.
- Develop new opportunities for economic growth at the provincial and municipal level.
- Accommodate growth and change in ways that maintain or enhance quality of life and promotes housing and transportation choice.
- Improve overall accessibility within the Niagara Peninsula to facilitate new growth opportunities and to reduce pressure on the QEW corridor.

Goal: To create a Transportation Development Strategy that promotes a healthy environment.

Objectives

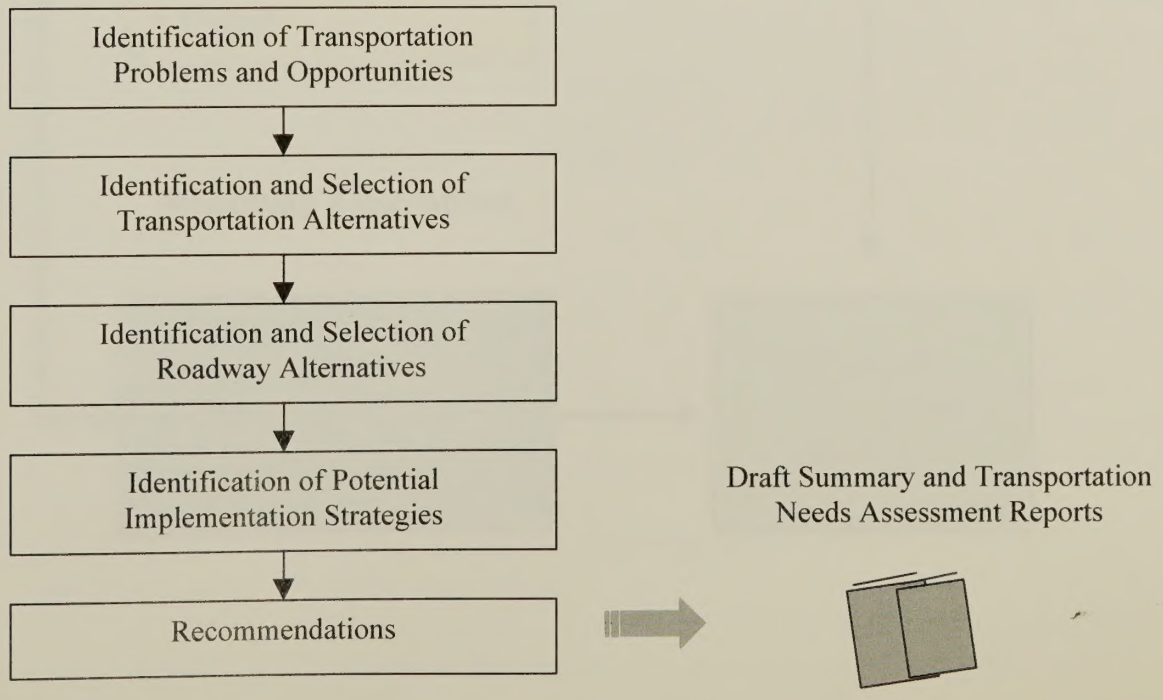
- Protect natural resources, including the tender fruitlands and Niagara Escarpment.
- Encourage growth in areas where it will have the least impact on the environment.
- Avoid and or minimize adverse impacts to significant environmental features.

These three goals take into consideration the linkage between transportation, land use/economic development and the environment. A Transportation Development Strategy for the area that supports these goals must recognize the significance of municipal planning and economic goals and the long-term well being of the residents, industry and businesses within the Niagara Peninsula, as well as the Province at large. In addition, the strategy must ensure the protection of natural resources including the tender fruitlands, the Niagara Escarpment, wetlands and other significant natural features.

Transportation Needs Assessment Process and Products

The Niagara Peninsula Transportation Needs Assessment Study included an assessment of the transportation network and long range planning problems, opportunities and transportation options in the Niagara-Hamilton area. In a long-term context, the Needs Assessment provides a multi-modal, ***Transportation Development Strategy*** for safe, efficient and cost-effective travel at all three levels - international, interprovincial and interregional. The process leading to the development of a Transportation Development Strategy is depicted below.

STUDY PROCESS AND PRODUCT



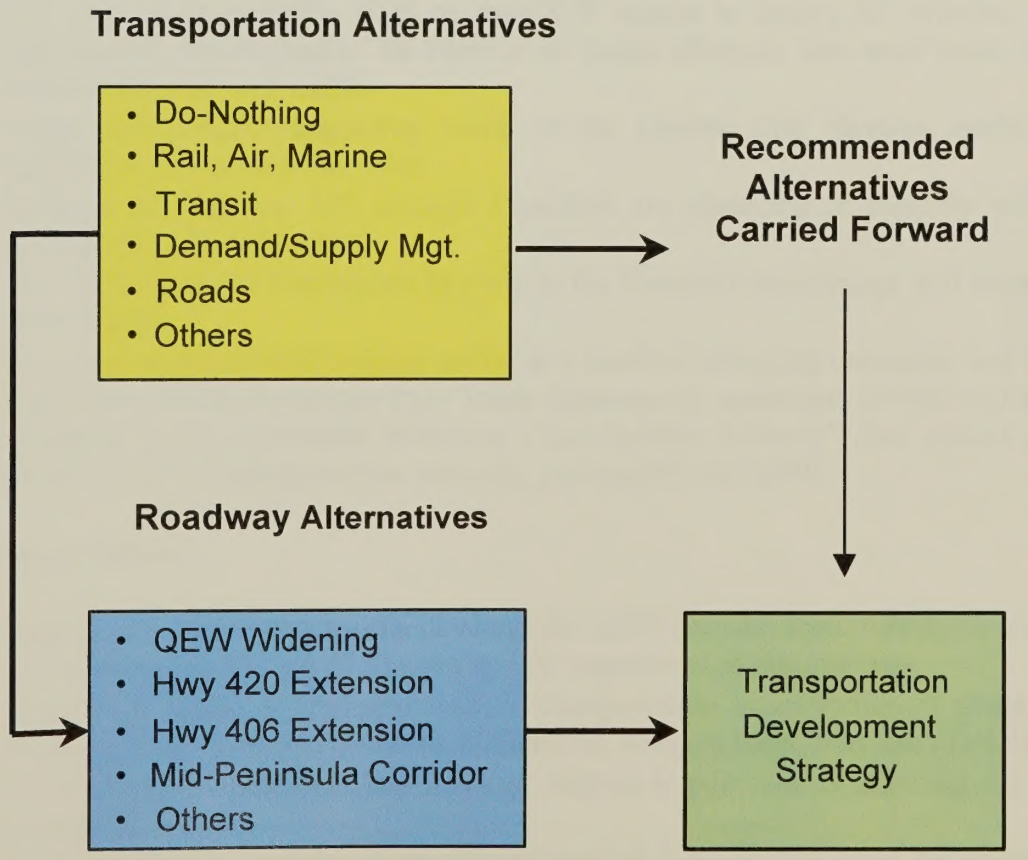
Transportation Alternatives Assessment

The needs assessment examines all travel needs – commuter, tourist, and goods movement in identifying long term problems and opportunities and considers all modes – road, rail, air and marine as possible options to improve the overall transportation system.

The transportation needs assessment process involves consideration of how proposed transportation planning alternatives meet the study goals and objectives. Reasonable options that meet the mobility and economic goals are carried forward into the Transportation Development Strategy. Roadway alternatives are then assessed in more detail in terms of transportation, economic and environmental considerations.

The preferred initiatives are then included in the Transportation Development Strategy. Through this approach a multi-modal transportation network plan can be developed consistent with provincial and municipal needs, objectives and policies.

Transportation Alternatives Assessment



The Transportation Outlook

The transportation network in the Niagara-Hamilton area consists of a combination of road, marine, air and transit service. In reviewing the performance and role of this multi-modal network in the context of the social, economic and transportation service to the community, there are many significant issues and outlooks that must be considered.

Provincial Issues

- The Queen Elizabeth Way (QEW) currently represents the only Provincial highway that links the international bridge crossings in Niagara with the GTA.
- The QEW, at four lanes through St. Catharines, is currently operating at capacity and requires upgrading (an EA for a widening to 6 lanes is being completed and will be available for public review in late June of 2001). There is need to determine the ultimate configuration of the highway relative to other network improvements.
- Traffic analysis and forecasting indicates that beyond 2021, there will be at least a two lane (freeway lanes) peak hour deficiency in an east-west direction through the Niagara Peninsula. This assumes that the aforementioned six lane widening through St. Catharines has been implemented.
- Any disruption to traffic flow on the QEW results in delays for vehicles, including commercial vehicle traffic, as there is no major alternate east-west route capable of accommodating such traffic.
- Future rehabilitation/upgrading work on the Garden City Skyway could result in significant delays and user costs.
- Sections of Highway 403 through Hamilton are operating at capacity with limited opportunities for upgrading.
- The QEW from the Burlington Skyway to the Freeman Interchange will reach capacity in the future.
- Increases in commercial vehicle traffic as a result of changing economic and regulatory conditions (North American Free Trade Agreement), economic growth in Ontario and changing goods movement practices ("just-in-time delivery") has placed additional pressures on the transportation network, particularly the QEW.

Municipal Issues

- Protection of the tender fruitlands along the QEW corridor from further development is a concern to the Region of Niagara and its constituent municipalities.
- There is a desire to enhance overall transportation accessibility to places such as Welland, Port Colborne, South St. Catharines, Niagara Falls, Fort Erie, Haldimand, etc.
- Accessibility to Hamilton International Airport is poor and is affecting the ability to expand the airport.
- The area hosts a number of significant natural features that must be protected from invasive development and infrastructure.
- There is a need to enhance the experience for visitors to the area through the provision of convenient, high-order, and high quality transportation services using existing or new facilities.

Future Outlooks

Population and Employment Growth

Population and employment forecasts confirm that the GTA is, and will continue to have an influence on travel through the Niagara Peninsula. It is anticipated that future transportation congestion issues in the GTA may result in a "spill-over" of population and employment growth from the GTA to surrounding municipalities. Total population in Hamilton and Niagara is forecasted to grow by 17 per cent between 2000 and 2031. With "spill-over" from the GTA, population is forecasted to grow by 39 per cent in Hamilton and 27 per cent in Niagara. Higher population and employment growth could therefore result in greater commuting and other trips across southern Ontario. Currently, much of the local travel is on a limited number of constrained provincial and municipal roads, and this will continue to increase.

Tourism

Tourist visitation to Niagara in 2000 was approximately 15 million. While Niagara Falls remains the key tourist attraction within the Peninsula, other areas such as the wine region are becoming more significant as a tourist generator. Forecasted visitations to Niagara range from about 22 million to upwards of 40 million, depending upon the investment level made in tourist facilities.

Goods Movement

On an average day, 7,100 trucks travel across the two Niagara bridges carrying a combined $280 million worth of goods per day. On an average workday (Monday-Friday) the truck volume is even higher - 8,600 carrying some $340 million worth of goods. Commercial vehicle traffic is expected to grow at between 2.6 and 3.7 per cent per year to 2031.

Rail facilities carry goods and people both into and through the analysis area. Currently, rail moves one-third of goods by value across the Peninsula. A review of economic factors affecting truck and rail traffic suggests that this share will likely remain stable over time.

It is expected that the tonnage of goods moved by marine will remain stable in the future as much of the goods carried are bulk commodity goods. Marine infrastructure is able to adapt to container shipping and intermodalism, which will allow it to remain competitive with rail for long distance bulk goods movement.

Passenger Movement

GO Transit operates daily commuter trains and buses from Hamilton to the GTA. VIA Rail provides service to Niagara Falls and St. Catharines as part of their Toronto-Niagara Falls-New York route. In the Hamilton to Niagara corridor, opportunities for commuting by rail appear to be limited, as a result of the low number of commuters that actually travel from Niagara to Hamilton or Toronto.

The Transportation Tomorrow Survey (TTS) data (1996) indicates that approximately 200 people commute by rail from the Niagara Region to the GTA on a daily basis. Estimates indicate that if a 5% market share is achieved, based on a similar GO Transit experience from other hinterland communities, approximately 600-700 commuter trips (one-way) by rail, ferry or inter-city bus, would be made between Niagara Region and the GTA in 2031.

The potential market for new or upgraded rail, ferry or inter-regional bus service today, and in the future is limited, and would not negate the need for improvements to the highway network.

Existing and Future Problems

Today, there are capacity constraints on the QEW through St. Catharines and on the Burlington Skyway. Even with the widening to 6-lanes through St. Catharines, capacity problems on the QEW will be experienced in the near future. Overall, by 2021 and without additional transportation system capacity, there will be a two lane, peak hour deficiency in an east-west direction through the Niagara Peninsula.

As the QEW is the only provincial facility that links the international bridges to the GTA, it is clear that there is a significant problem through the Peninsula and that over the long term this problem will intensify, resulting in less reliable travel through the region.

Exhibit 2 illustrates the existing and future areas of concern in the Niagara Peninsula freeway network.

Exhibit 2: Existing and Future Transportation Deficiencies

Existing and Future Transportation Deficiencies

The Transportation Development Strategy

The Niagara Peninsula Transportation Needs Assessment results in a Transportation Development Strategy that provides a safe, efficient, effective and reliable transportation system and also facilitates economic growth at both a provincial and regional/municipal level, while respecting critical environmental concerns. The strategy is consistent with the three basic guiding principles or pillars for "Smart Growth" in Ontario as identified by the Provincial Government:

- Sustaining a strong economy;
- Building strong communities; and
- Promoting a healthy environment.

There are fundamental elements regarding transportation in and through the Niagara Peninsula that were considered within the context of developing the Transportation Development Strategy:

- The efficient and reliable movement of commercial vehicles through the Niagara Peninsula area linking southern Ontario and the GTA to the international border crossings is vital to economic growth in the Region of Niagara, the City of Hamilton and the Province.

- The promotion of public transportation in the form of bus, rail and ferry services, provides transportation choice and the means to reduce automobile use; however, these modes can not address the diverse user needs nor significantly alleviate QEW traffic congestion.

- There are opportunities for improved transit and rail service to carry tourists/visitors between the GTA and the Region of Niagara.

- Rail currently plays a significant role in the movement of goods through the Peninsula and will continue to do so. However, it is unlikely that this share will increase due to the nature of the commodities transported and the trend towards greater use of "just-in-time" delivery.

The Transportation Development Strategy includes the following elements and is summarized in the attached **Tables 1** through **3**.

- Roadways;
- Transportation Systems Management;
- Passenger Rail Service;
- Travel Demand Management and Transit; and
- Ferry Service

These recommended initiatives are illustrated in the following **Exhibit 3** which shows the recommended roadway improvements and **Exhibit 4** which shows the recommended Transit, TDM and ITS Studies.

Roadways

The centrepiece of the Transportation Development Strategy is a new mid-peninsula highway running from the QEW between Niagara Falls and Fort Erie, westward to south of Hamilton International Airport, and then around Hamilton and connecting to Highway 407 in Halton Region.

It has been concluded that a new Mid-Peninsula Corridor (MPC) will be required along with strategic upgrading of the QEW beyond six lanes from Niagara Falls to Highway 403 to accommodate travel demand and to facilitate reliable goods movement, within, and through the study area. It is recommended that the MPC be constructed first and that strategic improvements to the QEW be made over the longer term. It is recommended that an Environmental Assessment Terms of Reference be initiated for the MPC to facilitate protection of the corridor. The MPC represents the platform around which other strategies have been formulated.

It should be acknowledged that the needs assessment study is proposing a possible corridor – not a definitive route. A formal environmental assessment would be utilized to examine route location options and impacts prior to determining a preferred route.

A new highway around Hamilton would provide direct access to Highway 407 and present a congestion free alternative to the Highway 403 and QEW routes through the Hamilton area. Such a highway could also connect to Highway 6 near Caledonia and Hamilton International Airport, Highway 403 serving Brantford and southwestern Ontario, and Highways 8 and 6 serving the Kitchener-Cambridge-Guelph area.

In Niagara Region, the new highway could connect to Highway 406 and Highways 58 and 140, providing an extensive provincial highway network through Niagara Region's southern tier.

Other elements of the suggested road strategy are also contained in **Tables 1** through **3** attached.

Exhibit 3: Recommended Roadway Improvements

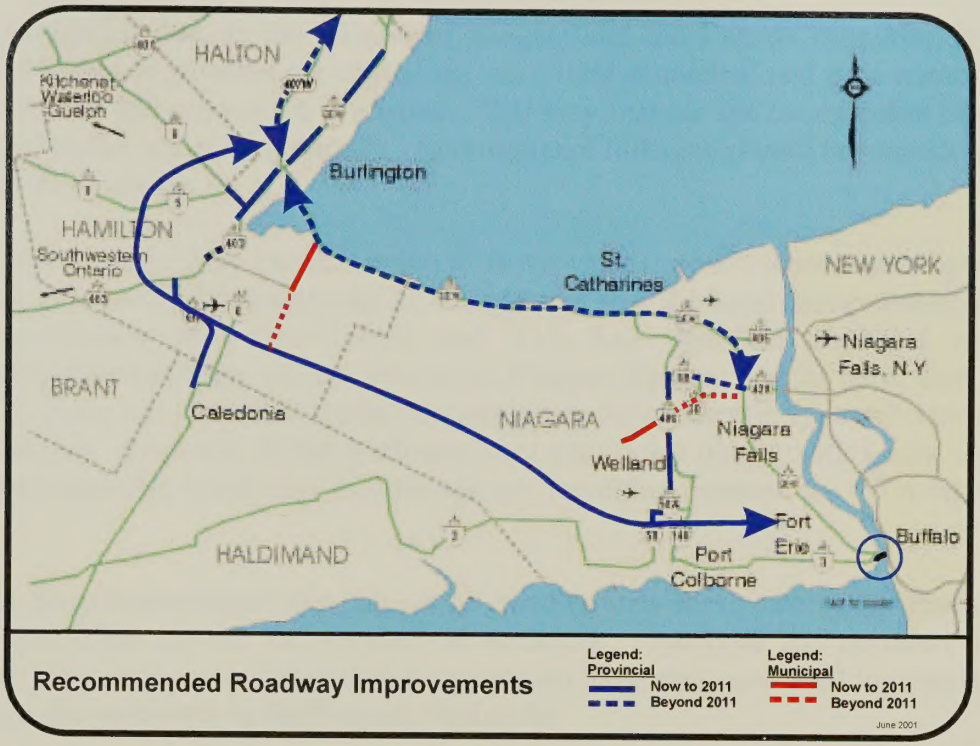
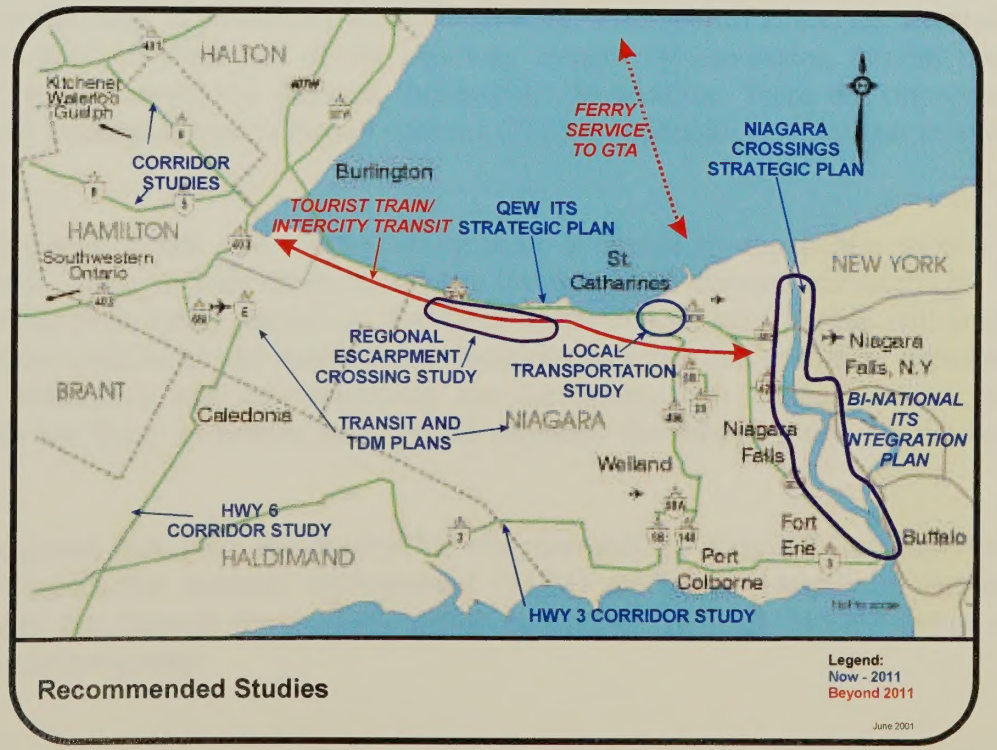


Exhibit 4: Recommended Studies



Passenger Rail, Transit and Ferry Services

It is recommended that, in the Region of Niagara and the City of Hamilton, studies be undertaken to assess potential for upgrading local, inter-municipal and rural transit services using traditional and innovative strategies. This may include the examination of the need for regional transit service in Niagara. Inter-regional linkages should be considered in the context of these studies.

With respect to upgrading transit service to serve visitors and/or commuters between the study area and the GTA in particular, it is suggested that the local transportation agencies initiate discussions with GO Transit and VIA Rail with the objective of further investigating the feasibility of rail service to Niagara Region, and in particular, Niagara Falls. The study has identified limited opportunities for commuter type rail service to the Niagara Region. However, it has confirmed that significant opportunities exist to provide rail or other inter-city transit services for visitors travelling between the GTA and Niagara Falls.

The study also acknowledged that there is an existing ferry service between Queenston and Toronto, providing service for visitors on weekends. Analysis has revealed a limited market for ferry services and that marine operations have some potential to remove limited traffic from the highways in the Niagara Peninsula.

Improving Roadway Efficiency (Transportation Systems Management and Travel Demand Management)

In conjunction with expansion of the road network, a number of strategies are available to facilitate more efficient use of the roadway system by increasing system speed and capacity without requiring physical expansion. In addition, there are opportunities to implement intelligent transportation systems (ITS) as technologies continue to evolve and develop.

Other emerging trends that are becoming more accepted by the public should also be considered. These include issues relating to transportation demand management. Drivers are adapting their travel patterns to deal with traffic congestion. People will continue to choose their residential and employment locations in ways that minimize inconvenience. Internet commerce and telecommuting are increasing their market shares and these initiatives are likely to reduce peak period demands for shopping and employment-type travel.

It is suggested that both the Region of Niagara and the City of Hamilton undertake transit/transportation demand management (TDM) studies to identify opportunities to reduce auto use through the implementation of strategic policies, incentives and demand management programs.

Rationale for the Proposed Transportation Development Strategy

The proposed Transportation Development Strategy addresses both provincial and municipal policies and issues.

Provincial Significance

The proposed development strategy achieves the following benefits:

- Enhances the ability of the Niagara trade corridor to accommodate growth in goods movement and tourism.
- Provides benefits to the provincial highway network in the Hamilton area including the QEW and Highway 403, by providing a congestion-free alternative.
- Permits the ability to defer any QEW widening beyond the existing six lanes and planned expansion through St. Catharines.
- Provides a viable, high capacity alternative to the QEW for autos and commercial vehicles.
- Permits more efficient rehabilitation/improvement of various elements of the QEW including the Garden City Skyway.
- Provides a viable alternate route in case of QEW closure due to an accident, spill or local weather-related issues.
- Facilitates improved linkages between the Niagara border crossings and Southwestern Ontario, including Kitchener/Waterloo, Guelph, London, etc. for vehicles and commercial goods movement.
- Provides additional road network capacity to deal with potentially significant increases in visitation/tourism to the Peninsula.

Municipal Significance

The proposed Transportation Development Strategy achieves the following benefits:

- Combined with other local/regional legislative initiatives, the development strategy may assist in facilitating protection of tender fruitlands along the QEW corridor.
- There will be substantive benefit to the local and provincial roadway network in the Hamilton area.
- The provision of an MPC will enhance freeway level accessibility to: Welland, Port Colborne, Thorold, Niagara Falls, Fort Erie, Haldimand and Hamilton International Airport.

Moving Forward - The Environmental Assessment Process and The Mid Peninsula Corridor

The MPC has been identified as the key element in the Transportation Development Strategy. A number of other strategy elements hinge on MPC implementation. As a consequence, it is recommended that MTO initiate the preparation of an environmental assessment Terms of Reference in preparation for an Environmental Assessment for the Mid-Peninsula Corridor. This process would include finalization of the Needs Assessment document.

TABLE 1:
SHORT TERM RECOMMENDATIONS – NOW TO 2005

Transportation Improvement Initiative	Project Description	Proponency
ROADWAYS		
QEW widening – Sand Plant Hill Implementation	Hwy 405 to Hwy420 – 4 to 6 lanes	Province
QEW widening - St. Catharines Implementation	Hwy 406 to Garden City Skyway Bridge – 4 to 6 lanes	Province
QEW widening – Burlington to Oakville Implementation	Burlington to Oakville - 6 to 8 lanes	Province
Highway 6 New - Implementation	Hwy 403 to Hamilton International Airport – 2 lane highway	Province
Highway 6 Widening - Implementation	Highway 403 to Highway 5 - 4 to 6 lanes	Province
Highway 406 Widening – Implementation	Beaverdams Rd. to Port Robinson (Thorold) – 2 lanes to 4 lane Controlled Access Highway	Province
Mid Peninsula Highway – Initiate EA Study	Niagara (QEW) to Halton (Hwy 407) 4 lane highway	Province
Highway 420 Extension – Initiate EA Study	Hwy 420 (Niagara Falls) to Hwy 58 (Thorold Tunnel) 4- lane Controlled Access Highway	Province
Highway 3 Corridor – Study	Fort Erie to St. Thomas	Province
Red Hill Creek Expressway Implementation*	Lincoln Alexander Parkway to QEW - 5 lanes	Hamilton
Improved Arterial Connection from Niagara Falls to Hwy 406 - Municipal Needs Study	Link Connecting Niagara Falls to Welland/Pelham area	Niagara
St. Catharines Improved Arterial Roads - Municipal Needs Study	Improvement to municipal roads to alleviate QEW traffic problems	St. Catharines
Niagara Regional Escarpment Crossing Study	Assessment of Regional Escarpment crossing requirements	Niagara

TABLE 1:
SHORT TERM RECOMMENDATIONS – NOW TO 2005

Transportation Improvement Initiative	Project Description	Proponency
TRANSPORTATION SYSTEMS MANAGEMENT		
Niagara Crossings – Develop Strategic Plan	Four Niagara Bridges and roadway access	T.B.D.
TRAVEL DEMAND MANAGEMENT AND TRANSIT		
Region of Niagara – Transit/TDM Study	Assessment of transit and travel demand management opportunities	Niagara
City of Hamilton - Transit/TDM Study	Assessment of transit and travel demand management opportunities	Hamilton
PASSENGER RAIL SERVICE		
Regional Rail Service - Rail Feasibility Study	Tourism (Weekend/ Seasonal) Niagara Region to GTA	T.B.D.
FERRY SERVICE		
Ferry Service – Opportunities Study	Niagara Region to GTA	T.B.D.

TABLE 2:
MEDIUM TERM RECOMMENDATIONS – 2006 TO 2011

Transportation Improvement Initiative	Project Description	Proponency
ROADWAYS		
Mid Peninsula Corridor – Staged Implementation	QEW in Niagara to Hwy 407 in Halton - 4 lane highway	Province/Private Sector
Highway 403 Widening – Implementation	QEW to Main St. (Hamilton) - 6 to 8 lanes	Province
QEW Widening - Freeman Interchange Implementation	Burlington Bridge to Freeman Interchange - 6 to 8 lanes	Province
Highway 6 New – Implementation*	Hamilton International Airport to Caledonia	Province
Highway 406 Widening – Implementation	Port Robinson (Thorold) to East Main St. (Welland) – 2 lanes to 4 lane Controlled Access Hwy	Province
Highway 406 Extension – Implementation*	East Main St. (Welland) to Hwy 58 or Mid-Peninsula Hwy – 2 lane Controlled Access Major Arterial	Province
Highway 6 Improvements – Corridor Needs Study	Caledonia to Lake Erie Operational / Local bypasses	Province
Highway 6 or Highway 8 and 24 Improvements - Corridor Needs Study*	Highway 5 to Highway 401	Province
Improved Regional Road 20 Implementation	Link Connecting Pelham to Hwy 406	Niagara
Hamilton North/South Links Municipal Needs Study*	Link connecting the Mid-Peninsula Highway to Red Hill Creek Expy.	Hamilton
*** Need / Function dependent of Mid-Peninsula Highway Route Location**		
TRANSPORTATION SYSTEMS MANAGEMENT		
QEW ITS – Develop Strategic Plan	Hamilton to Fort Erie including Highways 405, 406 and 420	Province
Bi-National ITS integration - Roadways and Bridges Develop Strategic Plan	QEW, Mid-Peninsula Highway, Municipal roads, U.S. roads, Niagara Bridges	T.B.D.

TABLE 2:
MEDIUM TERM RECOMMENDATIONS – 2006 TO 2011

Transportation Improvement Initiative	Project Description	Proponency
TRAVEL DEMAND MANAGEMENT AND TRANSIT		
Region of Niagara - TDM and Transit Strategy Implementation	TDM and Transit Strategies to support planning objectives	Niagara
City of Hamilton – TDM and Transit Strategy Implementation	TDM and Transit Strategies to support planning objectives	Hamilton
PASSENGER RAIL SERVICE		
Regional Rail Service - Implementation	Tourism (Weekend/ Seasonal) Niagara Region to GTA	T.B.D.
Commuter Rail Service - Rail Feasibility Study	Niagara Region to GTA	T.B.D.
FERRY SERVICE		
Ferry Service – Implementation	Niagara Region to GTA	Private Sector

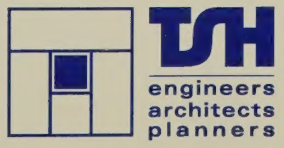
TABLE 3:
LONG TERM RECOMMENDATIONS – BEYOND 2011

Transportation Improvement Initiative	Project Description	Proponency
ROADWAYS		
QEW Strategic Upgrading –Staged Implementation*	Niagara Falls to Hamilton	Province
Highway 403 widening Implementation*	Main St. Hamilton to Lincoln Alexander Parkway	Province
Highway 407 Widening Implementation	Halton Region	Private Sector
Hwy. 420 Extension - Implementation	Hwy. 420 (Niagara Falls) to Hwy. 58 (Thorold Tunnel) - 4 lane C.A.H.	Province
Improved Arterial Connection from Niagara Falls to Hwy 406 – Implementation	Link Connecting Niagara Falls to Welland/Pelham area	Niagara
Hamilton North/South Link – Implementation*	Link Connecting Mid-Peninsula Highway to Red Hill Creek Expressway	Hamilton
PASSENGER RAIL SERVICE		
Commuter Rail Service - Implementation	Niagara Region to GTA	T.B.D.
TRANSPORTATION SYSTEMS MANAGEMENT		
QEW ITS – Implementation	Hamilton to Fort Erie including Highways 405, 406 and 420	Province
Bi-National ITS integration - Roadways and Bridges	QEW, Mid-Peninsula Hwy Municipal roads, U.S. roads, Niagara Bridges	T.B.D.

*** Need / Function dependent of Mid-Peninsula Highway Route Location**

Niagara Peninsula Transportation Needs Assessment Study

Technical Summary Report



A. IDENTIFICATION OF TRANSPORTATION PROBLEMS AND OPPORTUNITIES 1
A.1 INTRODUCTION 1
A.1.1 Purpose 1
A.1.2 Analysis Area 4
A.1.3 Background 4
A.1.4 Policy Context 6
A.1.5 Background Issues 7
A.1.6 Study Goals and Objectives 9
A.1.7 Assessment and Evaluation Framework 10
A.2 ANALYSIS AREA OVERVIEW AND OUTLOOK 12
A.2.1 Background 12
A.2.2 Trade and Economics 12
A.2.3 Tourism 14
A.2.4 Land Use and Development 14
A.2.5 Transportation 18
A.2.6 Niagara Gateway Crossings 19
A.2.7 Queen Elizabeth Way (QEW) 22
A.2.8 Modal Outlooks 22
A.2.9 Natural Environment Overview 24
A.3 ASSESSMENT OF EXISTING AND FUTURE TRAVEL DEMANDS 26
A.3.1 Existing Conditions 27
A.3.2 Horizon Year Conditions 29
A.3.3 Future Travel Demand 31
A.3.4 Identification and Assessment of Transportation Problems 34
A.4 TRANSPORTATION PROBLEM STATEMENT 37
A.5 IDENTIFICATION OF OPPORTUNITIES 38
A.5.1 Assessment of Opportunities 42

B. TRANSPORTATION PLANNING ALTERNATIVES 44
B.1 IDENTIFICATION OF TRANSPORTATION PLANNING ALTERNATIVES 44
B.2 ASSESSMENT AND EVALUATION OF TRANSPORTATION PLANNING ALTERNATIVES 45
B.3 SELECTION OF PREFERRED TRANSPORTATION ALTERNATIVES 46

C. ROADWAY ALTERNATIVES 49
C.1 IDENTIFICATION OF ROADWAY ALTERNATIVES 49
C.2 ASSESSMENT & EVALUATION OF ROADWAY ALTERNATIVES 53
C.2.1 Assessment & Evaluation of Long List of Roadway Alternatives 53
C.2.2 Assessment & Evaluation of Short List of Roadway Alternatives 56
C.3 SELECTION OF PREFERRED ROADWAY ALTERNATIVE(S) AND STAGING OPTIONS 63

D. FINANCIAL FEASIBILITY ASSESSMENT 64
D.1 FINANCIAL ASSESSMENT 64

A. IDENTIFICATION OF TRANSPORTATION PROBLEMS AND OPPORTUNITIES

A.1 INTRODUCTION

A.1.1 Purpose

The Niagara Peninsula Transportation Needs Assessment Study is a component of the Ministry of Transportation's (MTO) long range planning program to improve transportation through Ontario's major international gateways and highway corridors.

Needs Assessment is only the first step in the building of a new highway

Long range planning is critical to ensure that transportation investment is made where required, when needed, and in a manner that reflects provincial and municipal economic and environmental objectives. Transportation Needs Assessment Studies play a critical role in establishing the need for new or upgraded facilities, but represent only the first step in a complex environmental assessment and implementation process. It can take between eight to ten years to plan, design and build new highways.

Study partners include MTO, Region of Niagara and City of Hamilton

The Niagara Peninsula Transportation Needs Assessment Study has been undertaken by the Ministry of Transportation in partnership with the Regional Municipality of Niagara and the City of Hamilton. This unique provincial-municipal relationship was formed with the objective of establishing a comprehensive, multi-modal long-term plan for investment in transportation infrastructure in the Niagara Peninsula. The Study recognizes that transportation issues are closely associated with land use, economic and social factors.

A Transportation Development Strategy has been created in support of provincial and regional economic development goals

The purpose of the Niagara Peninsula Transportation Needs Assessment Study was to assess the operation of the transportation system within the Region of Niagara and the City of Hamilton and to identify long range problems, opportunities and transportation improvement options. The study provides a Transportation Development Strategy for a 30 year planning horizon.

While this study focused on international, inter-provincial and inter-regional travel, the need for municipal transportation related initiatives were also identified. A Transportation Development Strategy has been created in support of provincial and regional economic development goals.

The Needs Assessment is the precursor to the formal environmental assessment process

A transportation needs assessment study is a technical exercise to determine the need and justification for transportation improvements and the feasibility of various transportation alternatives. It is a precursor to the formal environmental assessment process for major transportation infrastructure such as new highways or extensions. Needs assessment studies represent, in effect, "homework" to determine what action, if any, should be conducted, prior to commencing costly environmental assessment studies.

Initiation of EA Process for New Highways

The conduct of a needs assessment study represents the first phase of MTO's process to initiate the environmental assessment process for new highways or extensions. This new framework integrates long range network planning and the requirements of the planning component of the Individual and Class EA processes. **Exhibit 1** illustrates the process.

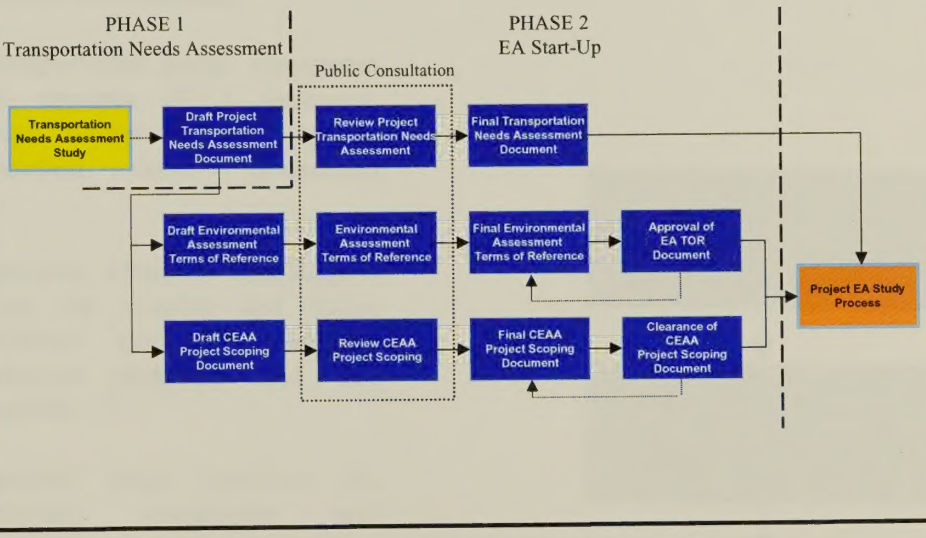


Exhibit 1: Initiation of the Environmental Assessment Process for New Freeways or Freeway Extensions

Phase 1 - Draft Technical Needs Assessment

During Phase 1 of the process, the Ministry works with municipal partners and consults with transportation providers, agencies and other stakeholders. A draft Transportation Needs Assessment Report is produced, documenting the technical results of the study.

Phase 2 - Environmental Assessment Terms of Reference

In the event that a new highway or extension is recommended, the Ministry undertakes Phase 2. This phase involves public consultation on the technical findings of the study and development of a Terms of Reference for an Environmental Assessment (EA) Study as required under the Provincial Environmental Assessment Act. The Terms of Reference outline the purpose, scope and consultative process for the EA study. It is subject to public review and Ministry of the Environment approval. Depending on the undertaking, there may also be a need for a Project Scoping Report and approvals under the Canadian Environmental Assessment Act. Phase 2 also involves completion of the Final Transportation Needs Assessment document.

Regional Niagara and City of Hamilton Official Plan updates to build on the Needs Assessment Study

In parallel to this study, the Region of Niagara and the City of Hamilton are undertaking separate Official Plan updates that will result in infrastructure "master plans" and growth management strategies for the respective communities. The Official Plan updates will build upon the results and recommendations of the Niagara Peninsula Transportation Needs Assessment. A key consideration in the context of growth management planning for both areas is the potential for new provincial and local transportation infrastructure and other "non structural" (Travel Demand Management, Transportation Systems Management, Intelligent Transportation Systems) strategies that may influence the nature and location of future urban development.

Transportation Needs Assessment Process

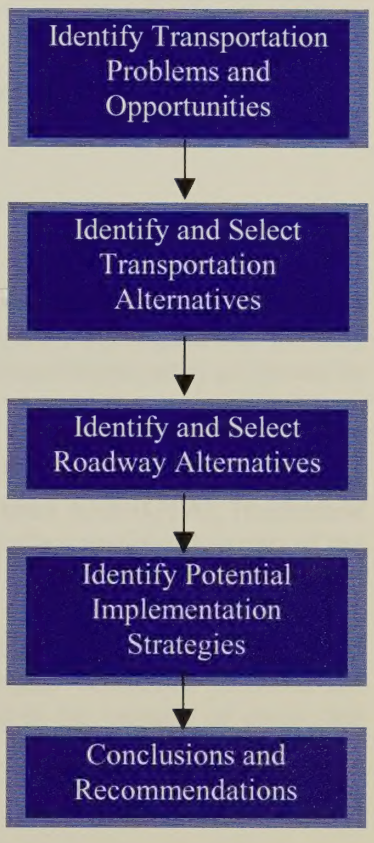
The transportation needs assessment process consists of a technical, analytical framework that guides transportation needs assessment studies.

It is a process, where the first stage is to assess the existing and future transportation system to identify transportation problems and any opportunities.

The second stage involves the identification, assessment and selection of transportation alternatives including all modes.

If the non-roadway transportation alternatives do not fully resolve current or future transportation problems, possible roadway alternatives are then identified, evaluated and selected in the third stage.

Analysis is then undertaken to determine the proponency (i.e. whom should be responsible) for the recommended road improvements. Financial feasibility and partnership opportunities are then addressed.



Study Consultation

Over the course of the study, MTO and the Consultant Team worked closely with staff of the Regional Municipality of Niagara, its constituent municipalities, and the City of Hamilton. In view of the significance of the initiative, consultation was also undertaken with Halton Region and Haldimand County at key points in the study.

While Phase 1 of the transportation needs assessment framework does not involve extensive consultation with stakeholders, a range of informal meetings, presentations, and contacts were made by ministry and consultant staff including:

- Ministries of Municipal Affairs and Housing; Economic Development and Trade; Tourism, Citizenship, Culture and Recreation.
- Niagara Falls Bridge Commission and Buffalo and Fort Erie Peace Bridge Authority.
- Greater Buffalo-Niagara Regional Transportation Council.
- New York State Department of Transportation.
- St. Lawrence Seaway Management Corporation;
- VIA Rail, GO Transit, Trillium Railway, Canadian Pacific Railway;
- Motor carriers and shippers; and
- Industry and businesses.

A.1.2 Analysis Area

The focus of the analysis was the Niagara and Hamilton area

The Niagara Peninsula Transportation Needs Assessment Study focused on the geographical area associated with the Regional Municipality of Niagara and the City of Hamilton (formerly Regional Municipality of Hamilton-Wentworth) as shown by the map in **Exhibit 2.**

As Niagara Region and City of Hamilton are part of the broader Golden Horseshoe Area, the transportation linkages with the Greater Toronto Area (GTA), Haldimand County, and the Kitchener-Waterloo-Guelph area were also considered as part of the study.

In addition, given the proximity to the United States and the strategic role of the Niagara Peninsula as a major international gateway and economic corridor, the bridge crossings into New York State were examined in the context of projecting traffic growth on the facilities.

A.1.3 Background

The Ministry of Transportation has conducted several major transportation studies in the Niagara Peninsula area in the 1990's.

Transfocus 2021

Perhaps the most comprehensive of the previous transportation studies was Transfocus 2021 – A Strategic Transportation Plan for the Niagara-Lake Erie Area, completed in 1995. This study offered a wide range of recommendations for provincial and municipal transportation improvements within the Niagara Peninsula to the year 2021.

Exhibit 2: Analysis Area

The Niagara Peninsula Transportation Needs Assessment Study builds on, and carries forward, many of the recommendations of Transfocus 2021.

Highway 420 Extension

In 1998, the Ministry initiated an environmental assessment study for a Highway 420 Extension, as recommended in Transfocus 2021. The proposed extension, westerly from the QEW to the Thorold Tunnel, was intended to provide another highway route between Niagara Falls and St. Catharines to divert traffic from the QEW through St. Catharines during rehabilitation of the Garden City Skyway and widening of the QEW.

Niagara Frontier International Gateway Study

The completion of the study was deferred on the basis of the findings of MTO's Niagara Frontier International Gateway Study (1998). This study was initiated in response to the Transfocus 2021 recommendation to consider an 8 lane widening of the QEW and a new potential Mid-Peninsula Corridor (MPC) through the Niagara area. The Gateway study concluded that both would be required over the long term, but did not address specific Mid-Peninsula Corridor alternatives or feasibility.

Niagara Escarpment Crossing Study

The Region of Niagara carried out the Niagara Escarpment Crossing Study in 1997 to address the issue of truck traffic on municipal roads crossing the Niagara Escarpment through small communities. This study recommended that a commercial trucking route be designated within Niagara and an improved escarpment crossing be constructed. The study further recommended that a feasibility study of the Mid-Peninsula Corridor be undertaken. The Region of Niagara plans to initiate an EA for a regional link crossing the escarpment in the near future.

Niagara Regional Transportation Strategy

Neither Niagara Region, nor the City of Hamilton, has carried out a recent large scale comprehensive, multi-modal transportation study. Niagara, however, has recently initiated a comprehensive Regional Transportation Strategy to examine how the transportation system can be developed to support and shape future development and promote economic growth in the area. This initiative will include an assessment of all modes – auto, truck, transit, rail, air, marine, pedestrian and bicycle. The recommendations from this Transportation Needs Assessment Study will be considered in the context of the development of a regional transportation strategy.

Niagara Falls Transportation Master Plan

In 1998, the City of Niagara Falls, in conjunction with the Region of Niagara and the Ministry of Transportation, undertook a Transportation Master Plan to develop a multi-modal transportation strategy to address existing and future travel demands within the community. Niagara Falls has a relatively small population (80,000) but accommodates between 14 and 15 million visitors a year. The study identified that the limitation to growth in visitation to Niagara Falls was transportation services within and to the community. Access to the community is currently constrained by:

- The capacity of the QEW;
- The capacity of international bridge crossings; and
- Access to the community via Highway 420.

A.1.4 Policy Context

Environmental Assessment Act

The Transportation Needs Assessment Study process integrates long range network planning with the generic technical requirements of the planning component of the Individual and Class Environmental Assessment processes consistent with the Provincial Environmental Assessment Act.

The Niagara Peninsula Transportation Needs Assessment Study was undertaken recognizing the broad based policy objectives embodied in the following *Provincial Policy Statement* (revised February 1st, 1997):

Provincial Policy Statement

> **"Long term economic prosperity will be supported by providing for an efficient, cost-effective, reliable, multi-modal transportation system that is integrated with the adjacent systems (and those of other jurisdictions), and is appropriate to address expected growth".** (Policy 1.1.3(c))

Ontario Smart Growth Strategy

The Ontario Government's "Smart Growth" initiative - a long term strategy for promoting and managing growth in the province includes four "smart growth" guiding principles, three of which relate to the integration of transportation, land use and public investment.

The following Smart Growth principles and objectives were used as policy context for the Niagara Peninsula Transportation Needs Assessment Study:

Facilitating Strong Economic Growth

1. Sustain a strong economy:
   - Develop new opportunities for continued economic growth and development.
   - Move people and goods more efficiently.
   - Use existing infrastructure and resources.
   - Promote technical innovation.

Strengthening Communities

2. Build strong communities:
   - Manage growth by making decisions about where development should go.
   - Strengthen quality of life in communities.
   - Promote housing choice.
   - Expand transportation choices within and between communities.

Promoting Healthy Environment

3. Promote a healthy environment:
   - Protect natural areas and farmlands.
   - Respect the environment by promoting measures that aim to reduce impacts.
   - Encourage growth in areas where it will have the least impact on the environment.

Regional Niagara Policy Plan

Niagara Region's Policy Plan presents a Regional Strategy for Development and Conservation, containing several strategic objectives to guide regional and economic development, many of which are consistent with the Ontario government's Smart Growth strategy.

The Regional Strategy supports staged development within two key corridors to relieve development pressure on the tender fruitlands and protect natural resources, such as the Niagara Escarpment: one between Thorold and Port Colborne and the other between Niagara Falls and Fort Erie. The policy recognizes the role of a new Mid-Peninsula Corridor and completion of Highway 406 in improving accessibility to these southern tier municipalities.

Within the Regional Strategy for Development and Conservation, a "Mid-Peninsula Corridor" route is identified which runs east-west through the region terminating at the Niagara Region and City of Hamilton boundary.

The City of Hamilton has not identified or considered a Mid-Peninsula Corridor in any planning policy or regional study.

A.1.5 Background Issues

The transportation network in the Niagara-Hamilton area is a combination of road, marine, air and transit services. In reviewing the performance of this multi-modal network, there are many significant issues and outlooks that must be considered.

A.1.5.1 Provincial

The QEW is a key economic link between central Ontario and the international border crossings in Niagara

Disruption to QEW traffic - means delays for autos and commercial vehicles

- The Queen Elizabeth Way (QEW) currently represents the only Provincial highway that links the international bridge crossings in Niagara with the GTA.
- The QEW, at four lanes through St. Catharines, is currently operating at capacity and requires upgrading (a Class EA for a widening to 6 lanes is currently being completed and will be available for public review in July of 2001). There is a need to determine the ultimate configuration of the highway relative to other network or system improvements.
- Traffic analysis and forecasting indicates that beyond 2021, there will be at least a two lane (freeway lanes) peak hour deficiency in an east-west direction through the Niagara Peninsula. This assumes that the planned six lane widening through St. Catharines has been implemented.
- Any disruption to traffic flow on the QEW results in delays for vehicles, including commercial vehicles, as there is no alternate east-west route capable of accommodating such traffic.
- Future rehabilitation/upgrading work on the Garden City Skyway could result in significant delays and user costs.
- The QEW also represents the key linkage between the GTA, Niagara Region and Niagara Falls providing access for tourists/visitors to the area.
- Sections of Highway 403 through Hamilton are operating at capacity with limited opportunities for upgrading.
- The QEW from the Burlington Bay Skyway to the Freeman Interchange in Burlington, will reach capacity in the near future.
- Increases in commercial vehicle traffic as a result of changing economic and regulatory conditions (North American Free Trade Agreement), economic growth in Ontario and changing goods movement practices *("*just-in-time delivery*")* will continue to place additional pressures on the transportation network.

A.1.5.2 Municipal

There is a desire to increase accessibility to the southern portions of the Peninsula in both Hamilton and Niagara

- Protection of the tender fruitlands along the QEW corridor from further development is a concern of the Region of Niagara and its constituent municipalities.
- There is a desire to enhance overall transportation accessibility to places such as Welland, Port Colborne, Thorold, Niagara Falls, Fort Erie, Haldimand, etc.
- Accessibility to Hamilton International Airport is poor and is affecting the ability to expand the airport.
- The area hosts a number of significant natural features that must be protected from invasive development and infrastructure.
- There is a need to enhance the experience for visitors to the area through the provision of convenient, high-order, and high quality transportation services using existing or new facilities.

A.1.6 Study Goals and Objectives

Building upon the *Provincial Policy Statement* and the government's "Smart Growth" principles, and recognizing the significant provincial and municipal issues as addressed above, the following Goals and Objectives were established for the Niagara Peninsula Transportation Needs Assessment Study.

Provide safe, efficient, effective and reliable transportation

Goal: To create a transportation development strategy that provides a safe, efficient, effective and reliable transportation system.

Objectives

- Move people and goods more efficiently through the Niagara Peninsula, by minimizing delays and reducing congestion.
- Maximize use of existing infrastructure and resources at both provincial and municipal levels.
- Expand and enhance transportation choice through consideration of transportation alternatives.
- Promote technological innovation to improve system efficiency and reliability.

Support sustained economic growth

Goal: To support sustained economic growth at provincial and municipal levels.

Objectives

- Sustain economic growth and position the municipalities within the Niagara Peninsula to compete locally, provincially and internationally.
- Develop new opportunities for economic growth at the provincial and municipal levels.
- Accommodate growth and change in ways that maintain or enhance quality of life and promotes housing and transportation choice.
- Improve overall accessibility within the Niagara peninsula to facilitate new growth opportunities and to reduce pressure on the QEW corridor.

Promote a healthy environment

Goal: To create a transportation development strategy that promotes a healthy environment.

Objectives

- Protect natural resources, including the tender fruitlands and the Niagara Escarpment.
- Encourage growth in areas where it will have the least impact on the environment.
- Avoid and or minimize adverse impacts to significant environmental features.

The three goals take into consideration the linkage between transportation, land use, economic development and the environment. A Transportation Development Strategy for the area that supports these goals must recognize the significance of municipal planning and economic goals and the long term well-being of the residents, industry and business within the Niagara Peninsula, as well as the

Province at large. In addition, the strategy must ensure the protection of natural resources including the tender fruitlands, the Niagara Escarpment, wetlands and other significant natural features.

A.1.7 Assessment and Evaluation Framework

Technical goals and objectives

The study goals and objectives form the foundation of the Assessment and Evaluation Framework. The goals and objectives are hierarchical in that some goals must have a greater degree of fulfillment than others, when assessing the relative merits of alternative solutions.

The ability of a proposed transportation alternative to address the goals/objectives and identified transportation problems is paramount. Where the option does not adequately address transportation objectives or problems, it may be "screened out" i.e. excluded from further consideration; subjected to further assessment of the basis of economic objectives and environmental feasibility; or recommended for inclusion as a complimentary element of the "Transportation Development Strategy".

The same screening process is applied to both "Transportation Alternatives" and "Roadway Alternatives".

This is a purely technical assessment approach. There is no weighting of goals, objectives or evaluation criteria as required in a detailed environmental assessment study. The proposed transportation alternatives, assessment and evaluation must be reviewed and modified through public consultation in the formal environmental assessment process. In addition, the environmental assessment study addresses the impacts of a range of roadway route alternatives. This goes well beyond the intent and scope of a transportation needs assessment study.

The adjacent graphic depicts the assessment and evaluation framework.

Transportation problems and opportunities

The first step in the evaluation framework is the identification of transportation problems and opportunities. This involves intensive assessment of current and future transportation needs and issues out to the year 2031.

Transportation alternatives

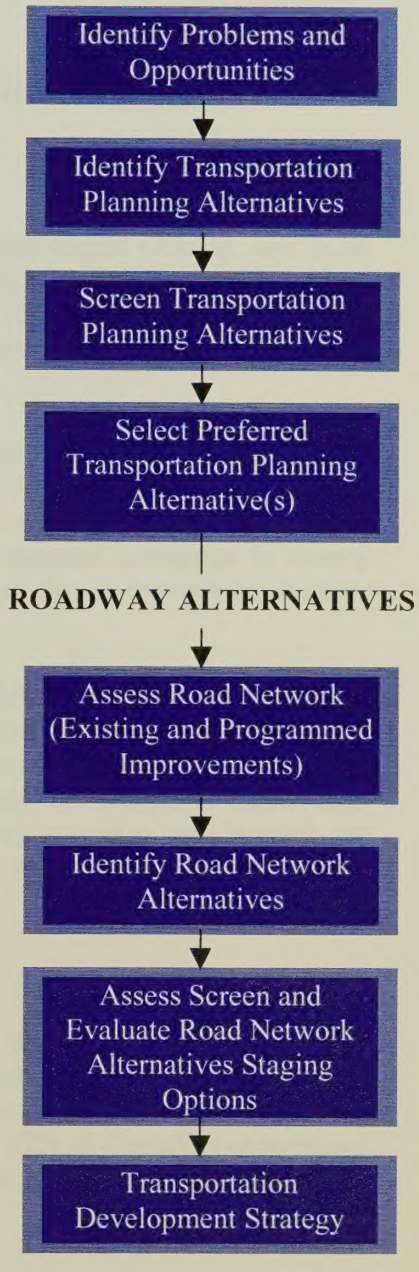
The second step involves the identification of a "long-list" of transportation alternatives and assessment of their ability to address transportation goals, problems and opportunities. These are then screened on the basis of the transportation objectives and criteria. This stage is covered in Section B of this report.

Roadway alternatives

Where roadway alternatives warrant consideration, a "long-list" of roadway options is generated to address the transportation goals, objectives and problems. Those options are then screened and the "short-listed" alternatives are further assessed in terms of economic objectives. Major alternatives such as a "Mid-Peninsula Corridor" are examined to determine the environmental feasibility and the potential impacts. A relative comparison and ranking of the proposed roadway alternatives is carried out on the basis of transportation, economic and environmental criteria. This step is conducted in Section C of this report.

Financial analysis

Part D of the report includes details of a feasibility level financial analysis.



Part E presents the recommended "Transportation Development Strategy" including recommendations for further study of transportation alternatives such as rail, bus and ferry services; travel demand management and intelligent transportation systems; and road network improvements for pursuit under the appropriate environmental assessment process e.g. provincial or municipal.

A.2 ANALYSIS AREA OVERVIEW AND OUTLOOK

A.2.1 Background

Niagara Peninsula - International tourism and trade gateway

The Niagara Peninsula area, strategically located within central Ontario, acts as an international trade and tourism gateway between the Greater Toronto Area and southwestern Ontario and the United States. Some 120 million people and major industry markets in Ontario, and neighbouring states in the U.S., lie within 500 kilometres of the Peninsula.

Niagara Region - A vital tourism growth area

The Regional Municipality of Niagara is part of a larger, bi-national region spanning the Niagara River. With four bridge crossings and major tourist attractions, the Niagara area is both a major tourism gateway and a vital tourism growth centre in the Ontario. The long term viability of the international crossings is clearly fundamental to trade, tourism and economic growth in the region and the broader Golden Horseshoe Area.

Economic prosperity directly related to high quality transportation services

The City of Hamilton is also in a unique position, functioning as a gateway from Niagara to the Greater Toronto Area and other economic centres in southwestern Ontario. The QEW and Highways 403, 6 and 8 are key highways linking Hamilton to Niagara and Halton Regions, Haldimand County and the Kitchener-Cambridge-Guelph areas. The efficiency of the provincial highway system in, and through, the Hamilton area can therefore be considered as essential to economic prosperity in the broader Golden Horseshoe Area.

A.2.2 Trade and Economics

93% of Ontario's exports are destined for the U.S.

International trade and goods movement through the peninsula into Canada's economic heartland is critical to the regional, provincial and national economies. Canada and the United States enjoy the largest bi-national trading relationship in the world, at about $590 billion in 2000. Approximately 87% of Canadian exports and 93% of Ontario's exports go to the U.S. Increases in exports during the past few years account for 20% of Ontario's economic growth.

16% of all Canada-U.S. trade crosses at the Niagara Frontier

The Niagara Peninsula is a key economic trade corridor connecting the eastern U.S. seaboard and northeastern U.S. industrial centres to the GTA, Kitchener-Waterloo and southwestern Ontario. The Niagara Frontier plays a significant role in this trade, as about 16% of all Canada-U.S. trade moves through the Peninsula to cross the border.

Exhibit 3 illustrates year 2000 average daily truck cargo values and volumes for south-central Ontario.

QEW - $390 million in goods every day

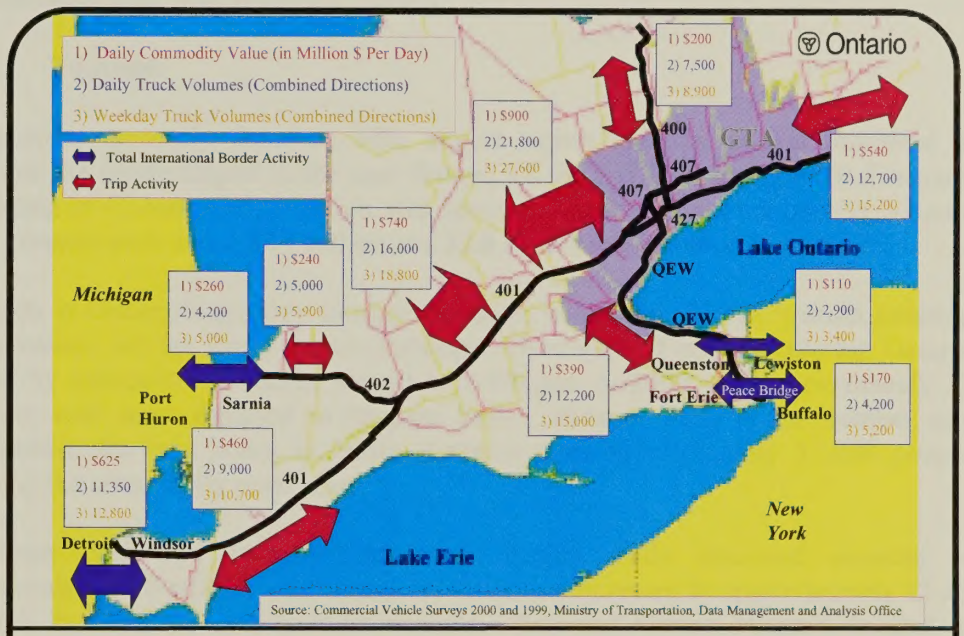


Exhibit 3: 2000 Average Daily Truck Cargo Values And Volumes

The QEW is a primary truck route linking the Niagara bridge crossings to the Greater Toronto Area (GTA) and the rest of southern Ontario. On an average workday, 15,000 trucks travel the QEW through Stoney Creek, hauling approximately $390 million in goods.

A.2.2.1 Trade and Economic Outlook

Currently, international trade through the Peninsula carried by truck relies on a single controlled access facility, the QEW. Temporary capacity restrictions on the QEW caused by construction, weather or emergency situations has significant and immediate impacts on the ability of trucks to travel through the corridor.

An analysis of possible future truck growth levels using trends, GDP, exchange rates, etc. suggests a truck growth rate from now to 2031 of between 2.6% and 3.2% per annum. Just-in-time delivery is, and will continue to be, the key to shipping in the manufacturing sector with a continued heavy reliance on the truck mode. In fact, just-in-time delivery may result in a scenario where truck volumes grow at a rate in excess of the GDP reflecting smaller loads on more trucks in order to accommodate the demand.

International trade is vital to the Province's economic health

It is clear that international trade across the Niagara Frontier and through the Peninsula linking to the GTA and other economic centres is of vital importance to the economic health of the province, the country and also adjacent U.S. states. Given industry's increasing reliance on just-in-time delivery, and the continued and possibly growing reliance on the truck mode, uncertainty of travel times through the

Peninsula as a result of congestion, will have major implications with respect to international trade and economic growth.

A.2.3 Tourism

Tourism is Ontario's fifth largest export industry

Tourism is currently Ontario's fifth largest export industry and is projected to become the fourth largest in the near future. Of the $47.3 billion (1998) of tourism spending in Canada, $11.5 billion was spent in Ontario. Expenditures in Niagara and Toronto were about $2.1 billion and $2.8 billion respectively.

Niagara is Ontario's primary tourism gateway, with over 50% of tourists entering the province via the international crossings. Over 90% of tourists entering Ontario travel by automobile. Tourist visitation to Niagara in 2000 was approximately 15 million with most destined to Niagara Falls. Niagara Falls is the number one destination for tour buses in North America with approximately 13,000 people visiting the community each year.

Between 1981 and 1996, visitation to Niagara Falls remained constant at approximately 10 million visits per year; visitation increased to approximately 12-13 million in 1997 and continues to increase. "Interim" Casino Niagara, located in Niagara Falls, was the catalyst for recent increases in visitation to the community. Casino Niagara was opened in late 1996 and in 1997 attracted approximately 9 million visitors.

In 2003, a new "permanent" casino will open in Niagara Falls providing an additional catalyst for increased visitation and re-development.

A.2.3.1 Tourism Outlook

Tourist visitations to Niagara are currently at about 15 million.

While Niagara Falls remains the key tourist attraction, other initiatives such as the wine industry and other activities are becoming more significant to the community.

The value of the Canadian dollar has a large impact on tourism. A low Canadian dollar helps to encourage both Americans and Canadians to travel within Canada. Forecasted visitations to Niagara range from about 22 million to up to 40 million (by 2031) depending upon the investment level made in local tourist facilities. The highest visitation forecast may require an investment level of about $3 billion in tourism related infrastructure.

Passenger rail service could support growth in Niagara

Passenger rail and marine service could play a strong role in supporting tourism growth in Niagara; it is, however, expected that the automobile will continue to be the dominant mode of transportation for tourists visiting the Peninsula and GTA due to the flexibility offered by this mode. Since the quality of the trip made by a tourist affects the likelihood of making a repeat visit, the mixing of tourist traffic with growing truck volumes on the QEW may impact visitation levels.

A.2.4 Land Use and Development

Integrated land use and transportation planning

The Regional Municipality of Niagara has recognized the importance of developing a transportation system that encourages land use and economic development south

of the escarpment to alleviate urbanization pressures on the tender fruitlands along the QEW corridor. The development capacity presently exists within the urban limits of Niagara Region communities south of the escarpment.

The former Hamilton-Wentworth Region also recognized the importance of integrated transportation and land use planning. The City of Hamilton is now undertaking an Official Plan review process as part of the recent amalgamation of the six local municipalities. With substantial growth already taking place south of the escarpment and the proposed development in the vicinity of Hamilton International Airport, the City of Hamilton is considering how the transportation system can be developed to support and shape future development and foster economic growth

The population in the Niagara Peninsula is largely located in urban areas with the major centres clustered around the provincial highway system.

The existing population distribution in the Greater Golden Horseshoe Area is shown on **Exhibit 4**.

The Regional Municipality of Niagara is comprised of 12 local municipalities clustered along the QEW and Highway 406 with a total population of 426,000.

The New City of Hamilton is comprised of six former local municipalities of the old Region of Hamilton-Wentworth totalling 499,000. The larger proportion of the population is contained within the old City of Hamilton boundaries with most population growth taking place south of the escarpment.

The Counties of Erie and Niagara in New York State that include Buffalo and Niagara Falls, contain 1.2 million people. These counties have experienced limited economic growth over the last decade and together with Niagara Region and Hamilton are looking for ways to stimulate economic development.

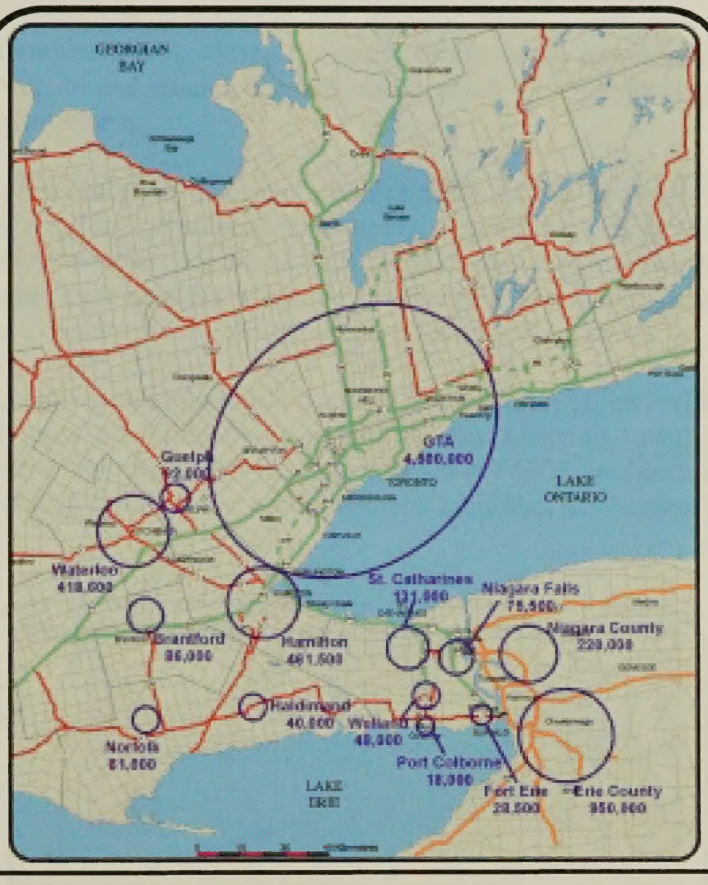


Exhibit 4: Existing Population Distribution in the Greater Golden Horseshoe Area

A.2.4.1 Land Use and Development Outlook

Niagara and Hamilton are able to attract and accommodate "spill-over" growth from the GTA

It is anticipated that future transportation congestion issues in the GTA may result in a "spill-over" of a component of population and employment growth from the GTA to surrounding municipalities. Niagara and Hamilton are well positioned to attract and accommodate some of this potential growth. Additional increases in population and employment were considered as a future scenario as part of the demand forecasting component of the study.

Both Niagara and Hamilton have an adequate supply of land available for development. Lands currently designated in both Municipal Official Plans can accommodate an accelerated level of growth in areas that can readily be provided with municipal services.

In Niagara Region, 92% of trips are internal to the region

Higher population and employment growth will result in greater levels of local and inter-regional travel demand within the analysis area. This will translate to increased automobile travel; currently, much of the local travel is on a limited number of provincial and municipal roads, some which are experiencing operational and/or capacity problems.

In making business location decisions, transportation access and mobility are only two of several variables considered by industry. Given the anticipated congestion levels in the GTA however, combined with the importance of the Niagara Peninsula as an international trade corridor, it can be anticipated that transportation access will be an important consideration in future business location decisions.

Population and employment forecasts confirm that the GTA is, and will continue to be by far the most predominant geographical area affecting travel through the Niagara Peninsula. Population growth forecasts for the GTA as shown in **Exhibit 5** significantly outstrip forecasts for other locations including the bordering American states.

Exhibit 5: Population Forecasts Base Assumptions

Exhibit 6 shows a potential scenario for growth in both Hamilton and Niagara for the 2031 planning horizon. This scenario reflects the "spill-over" effect resulting from congestion in the GTA. It is important to recognize that this "spill-over", will affect all hinterland areas surrounding the GTA, and not just Hamilton and Niagara.

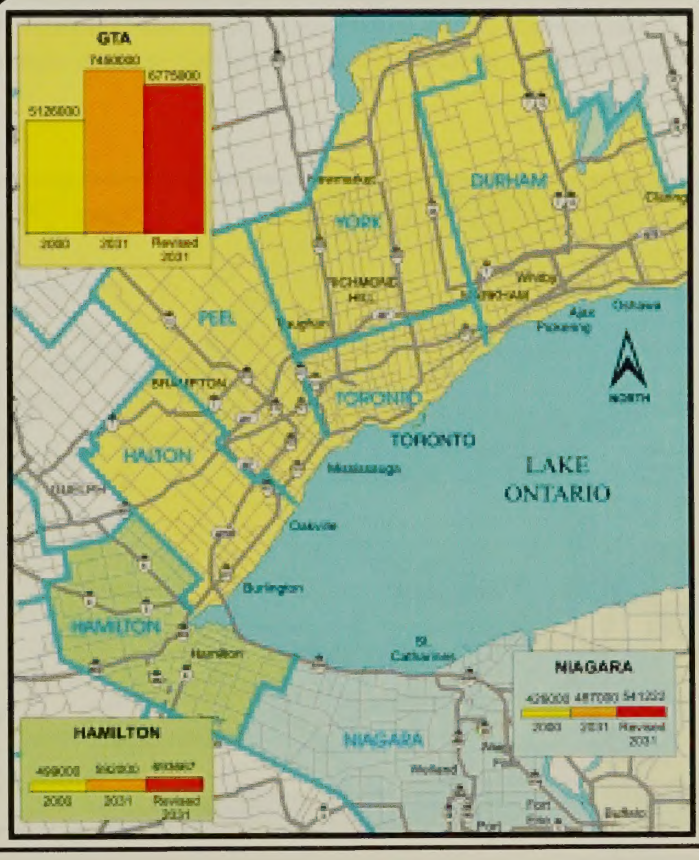


Exhibit 6: Population Forecasts - Hinterland Growth Adjustment

A.2.5 Transportation

Barriers to transportation service

The transportation network in the Niagara-Hamilton area as depicted in **Exhibit 7** is multi-modal in nature and is a combination of road, marine, rail, air and transit facilities. Key factors influencing or affecting the provision of transportation services and mobility in the analysis area include:

- The Niagara River.
- The Welland Canal.
- The Niagara Escarpment.
- The Burlington Bay Skyway.

These existing natural and man-made constraints restrict the provision of transportation facilities to a limited number of road and rail corridors and crossings.

A.2.6 Niagara Gateway Crossings

The four international road bridges crossings between Ontario and New York State and the QEW represent the major components of the transportation system and the efficient operation of these facilities is fundamental in facilitating international trade and tourism.

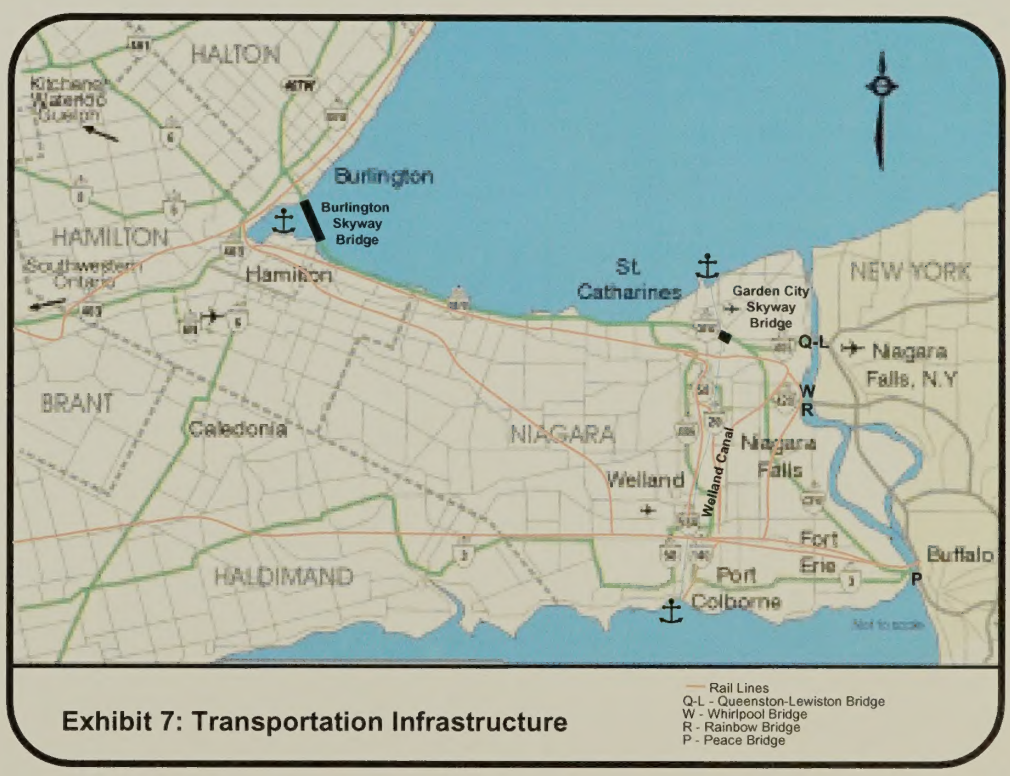


Exhibit 7: Transportation Infrastructure

Niagara cross-border truck traffic growing at 5% annually

The Peace Bridge and the Queenston-Lewiston Bridges are the key truck crossings. Over the period 1995 to 2000, annual truck traffic grew by 28 % representing 540,000 vehicles across the Niagara frontier. The Niagara crossings constitute 29% of all Ontario-U.S. commercial traffic and 77 % of traffic between Ontario and New York. Peace Bridge truck volumes rose by 26 % to 1.4 million annually and Queenston-Lewiston Bridge truck traffic increased by 32 % to just over 1 million over the same period.

8,600 trucks cross the border every weekday

On an average day (Monday-Sunday) 7,100 trucks travel across these two Niagara bridges carrying a combined $280 million worth of goods per day. On an average weekday (Monday-Friday) the truck volume is even higher - 8,600 carrying some $340 million worth of goods every weekday. The distribution of this truck traffic is shown in **Exhibit 8**.

The four international bridge crossings are also critical to the movement of tourists in and through the Niagara peninsula. Over the past 15 years, cross-border automobile traffic has fluctuated with the Canadian-U.S. exchange rate. Canadian tourists and shoppers appear to be highly dependent on the value of the Canadian dollar. In contrast, U.S. travellers appear not to be affected by the valuation as the price differential has generally been in their favour over the last decade.

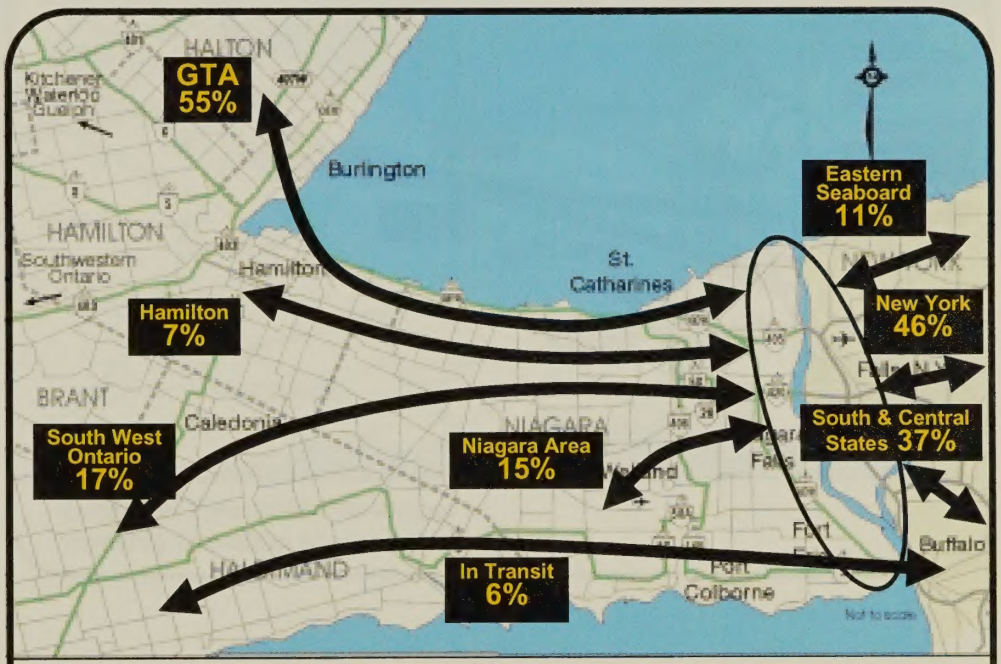


Exhibit 8: Year 1999 Commercial Vehicles Crossing Niagara Gateway (Preliminary Results 1999 CVS)

The falling dollar has affected Canadian visitation to the U.S.

While a slight increase in annual travel by U.S. residents to Niagara Falls can be attributed to the opening of the "interim" casino in 1996, the decrease in Canadian cross-border travel has negated any significant increase. Indeed, total passenger traffic has not yet returned back to levels experienced in the early 1990's, when the Canadian dollar was around $0.90U.S. The falling Canadian dollar clearly has an affect on the propensity for Canadians to vacation and shop in the United States.

With a high Canadian dollar value, a greater number of Canadians are attracted to the U.S.; during the early 1990's, approximately two-thirds of the cross-border traffic was Canadian. By 2000, the Canadian dollar had decreased to $0.67U.S. resulting in four million fewer Canadian vehicle trips to the U.S. American vehicles presently comprise approximately two-thirds of all cross-border passenger vehicle traffic.

Exhibits 9 and **10** show the distribution of passenger vehicle trips at the Niagara Gateway Crossings and the distribution of tourist trips to Niagara Falls, respectively.

While a large amount of the cross-border passenger traffic is related to Niagara Falls, the QEW is the primary tourist route connecting the highway and road system to the bridges.

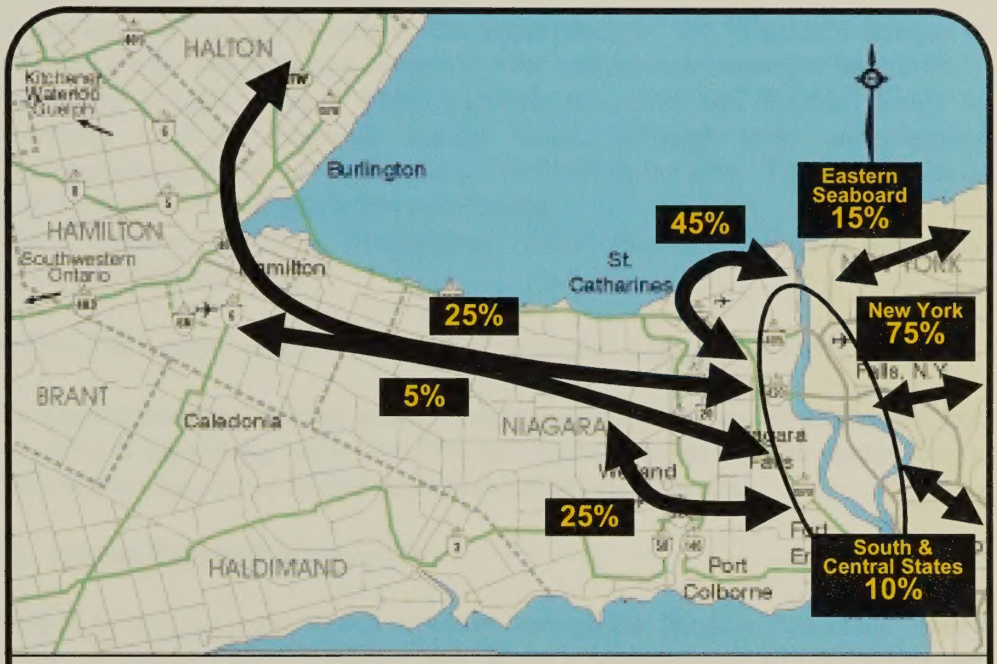


Exhibit 9: Year 2000 Passenger Vehicles Crossing Niagara Gateway

Exhibit 10: Niagara Falls Tourism Visitation

There are three rail crossings of the Niagara River into New York State.

- Canadian National (CN) utilizes the upper deck of the Whirlpool Bridge in Niagara Falls. This structure is used by VIA and Amtrak passenger rail traffic.
- Michigan Central Bridge, which parallels the Whirlpool Rapids Bridge is currently used by Canadian Pacific traffic although there are ongoing discussions relative to rationalization of facilities in the area. This may result in the elimination of rail traffic from this bridge.
- The International Railway Bridge north of Fort Erie and Buffalo is owned by Canadian National (CN).

These two rail bridges are expected to continue to play a key role in the future.

Rail carries one-third of goods to the U.S.

While truck is the predominant mode of transport for goods across the border, rail carries 32% of exports by value and 35% by weight. Therefore, both modes play a key role in the transport of freight through the Niagara Peninsula.

A.2.7 Queen Elizabeth Way (QEW)

The QEW is the major provincial highway through the Niagara Peninsula. Daily volumes are highest in the Hamilton area where a large number of commuters use the facility to travel between Hamilton and the GTA. A large number of local residents use the QEW through St. Catharines due to the difficulty in moving east-west on city streets.

QEW design hour volumes are 25% higher than peak hour volumes

QEW usage by tourist/recreational users is seasonal with volumes 25% higher during the summer than the AADT. These location and peaking characteristics place significant pressure on sections of the QEW (i.e. through the St. Catharines and Hamilton areas).

A.2.8 Modal Outlooks

A.2.8.1 Marine

Approximately 2.4% of the total value of Canadian-U.S. trade are carried by marine.

The marine shipping industry plays an important role in the movement of goods through the analysis area. Marine is responsible for approximately 39% of the total tonnage of Canadian goods moved both domestically and internationally. Marine transport generally carries bulk commodity goods such as coal and ores.

Key marine facilities within the analysis area include the Port of Hamilton and the Welland Canal. The Welland Canal is an integral part of the St. Lawrence Seaway as it links Lake Ontario to Lake Erie. In an average year, 12 million tonnes of cargo, on over 700 commercial ships, move through the Port of Hamilton, ranking it first in the entire St. Lawrence Seaway for the number of shipments and total tonnage handled.

It is expected that the tonnage of goods moved by marine will remain stable in the future as much of the goods carried are bulk commodity goods. Marine infrastructure is able to adapt to container shipping and intermodality, which will

allow it to remain competitive with rail and truck for long distance, bulk goods movement.

Additional cross-lake ferry services

There is also the potential for an increase in passenger movement by marine (ferry). Previous daily ferry services between the Hamilton-Niagara area and the GTA have not proven to be financially viable. A ferry aimed at tourists is currently operating on weekends between Toronto and Queenston. A private sector proposal has been prepared regarding the operation of a ferry between Toronto and Rochester, New York. At the time of this writing, no service has been implemented in this regard.

A.2.8.2 Rail

Rail facilities carry goods and people both into and through the analysis area. Rail service in the analysis area is operated by: Canadian Pacific Railway, Canadian National, Port Colborne Harbour Railway (Trillium Railway), Canada Southern (CASO), GO Transit and VIA Rail.

Rail Freight

Currently, rail moves approximately one-third of goods by value across the Peninsula. A review of economic factors affecting truck and rail traffic suggests that this share will remain stable over time. If this share holds over the long term, this implies substantial growth in rail freight, as total tonnage moved is anticipated to increase substantially.

Rail Passenger

GO Transit operates daily commuter trains and buses between Hamilton and the GTA. VIA Rail services Niagara Falls and St. Catharines as part of their Toronto-Niagara Falls-New York route.

Between Niagara and the GTA, opportunities for commuting by rail appear to be limited as a result of the low number of commuters who actually travel from the Niagara Region to Hamilton or Toronto.

A.2.8.3 Air

There are three airports within the analysis area - the Hamilton International Airport, the Niagara District Airport and the Welland-Port Colborne Airport. The Hamilton International Airport specializes in courier and cargo transport, but continues to expand its passenger services. The others are local community airports.

Air freight

Air freight and courier shipments are generally high value transactions, although generally low in volume. As an indicator of the growth in the air freight sector, it is noted that between 1990 and 1999 the overall air cargo volumes at Pearson International Airport increased by an average of 4.5% per annum. The fastest growing sector is between Canada and the eastern United States.

Air passengers

While the international airports in Toronto and Buffalo can be expected to be the major passenger airports in the future, the Hamilton International Airport could play a greater role in the transport of specialized goods, as well as accommodating passenger services to smaller markets.

A significant issue related to air transportation is accessibility to the airports from the road network. Air transit requires efficient ground transportation facilities to link the airports to the final destination for passengers and cargo.

Improved highway connections could substantially improve airport accessibility and use. The proposed Highway 6 New link between Highway 403 and Hamilton International Airport will provide enhanced access to this facility.

A.2.8.4 Local and Inter City Transit

Individual local municipalities within the study area operate their own conventional transit and para-transit services. Based upon data extracted from the 1996 Transportation Tomorrow Survey (TTS) data, it has been determined that approximately 2% of trips in Niagara Region and 7% of trips in the City of Hamilton were made by municipal transit. An additional 1% of trips were made using GO Transit in Hamilton.

A.2.9 Natural Environment Overview

Analysis area includes Niagara, Hamilton and Burlington

A.2.9.1 Description of Analysis Area

An analysis area was defined to allow for the consideration of new corridor possibilities to the south of the Niagara Escarpment and around the south of Hamilton. The initial analysis area selected included the new City of Hamilton, the Regional Municipality of Niagara and part of the City of Burlington in the Regional Municipality of Halton. The western portion of the Regional Municipality of Halton was included because of the importance of being able to move traffic to and through Hamilton to the Greater Toronto Area and beyond.

A.2.9.2 Constraint Mapping

Constraint mapping

Natural and built environment features within the analysis area were mapped using secondary sources and consolidated into a "Constraint Map" as shown in **Exhibit 11**. This constraint map was used as the basis for the examination of the environmental and technical feasibility of potential new transportation corridors. The intent was to minimize the potential for adverse environmental effects while satisfying the transportation and economic objectives of the study.

A set of environmental factors were established that are consistent with the policies and principles underlying the Planning Act, Provincial Policy Statement and the Government Smart Growth initiative. These are discussed in more detail in Part C - "Identification and Assessment of Roadway Alternatives".

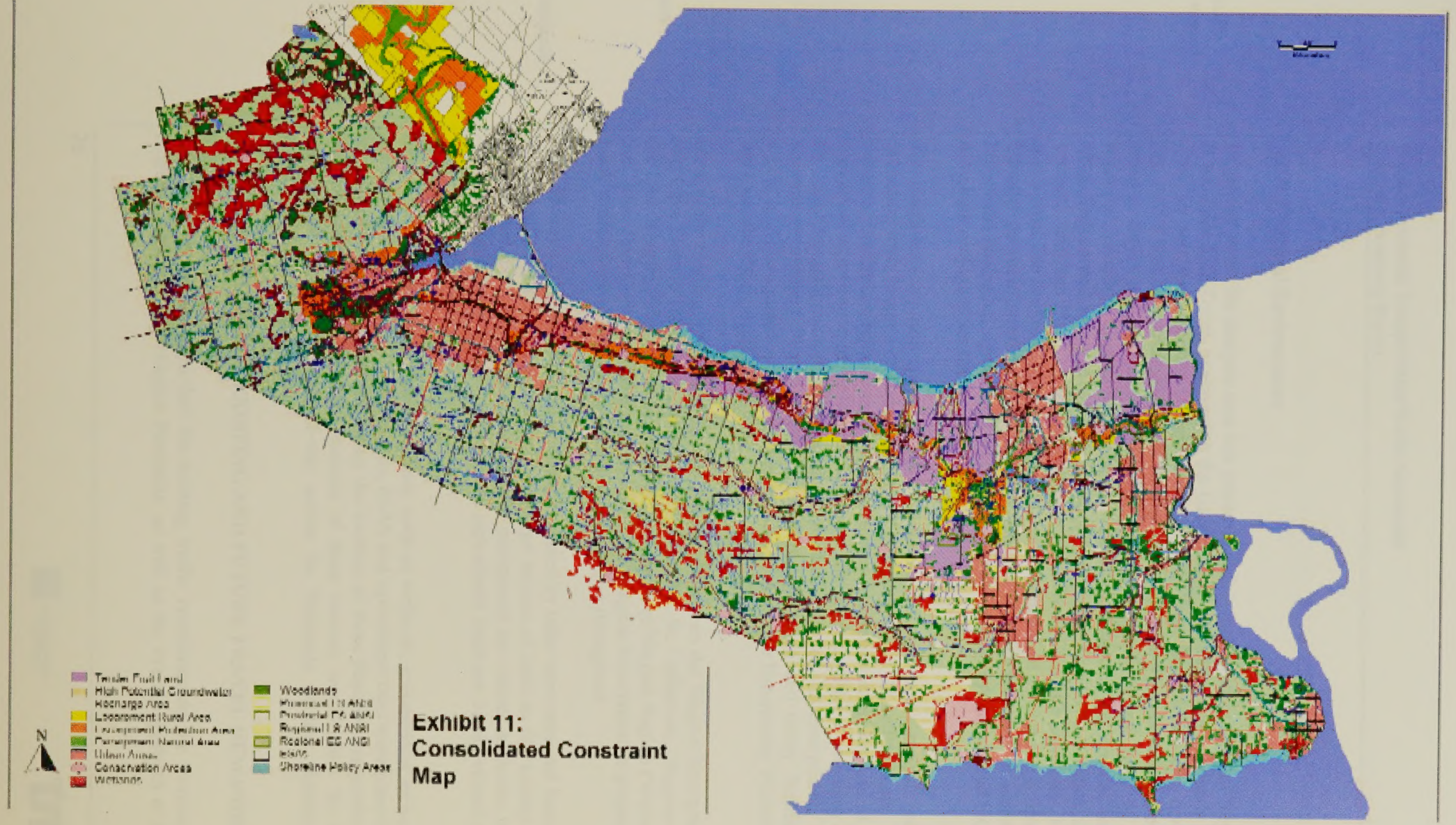


Exhibit 11:
Consolidated Constraint Map

A.2.9.3 Natural Environment

Biologically diverse region

In general terms the analysis area lies primarily within the Deciduous Forest Region (Carolinian Life Zone), grading into the Great Lakes - St. Lawrence Lowlands Life Zone in northern Hamilton. The Carolinian Life Zone is a biologically diverse region that is at its most northerly extent in southern Ontario. Rich deciduous woods, prairies, alvars and wetlands characterize the area. The flora and fauna of this region are unique to Canada and many rare habitats and species are recorded in the remaining natural areas of the Carolinian region. The Carolinian Canada zone occupies less than 1% of Canada's landmass, but 25% of Canada's population lives in the area. The area has more species of plants and birds than any other life zone in Canada. As such, even small, degraded or isolated remnant woodlots or wetlands have some ecological significance while larger natural, relatively undisturbed blocks have high ecological sensitivity and value.

The Niagara Escarpment is the most dominant natural feature in the analysis area – extending from Niagara-on-the-Lake through Hamilton to the Bruce Peninsula. The Niagara Escarpment represents a major constraint to transportation because of the ecological significance of the natural areas and the linear corridor it provides; and the steep topographical relief along much of the length of the escarpment. The Niagara Escarpment Plan permits "essential transportation and utility facilities" within lands designated as the Escarpment Natural Area, the Escarpment Protection Area and the Escarpment Rural Area.

Urban development

Most of the existing urban development is located between the Niagara Escarpment and Lake Ontario (Hamilton, Stoney Creek, Grimsby, St. Catharines, Niagara-on-the-lake, Niagara Falls) and at the southwestern corner of Niagara Region (Welland, Fort Erie, Port Colborne). The area south of the Niagara Escarpment is primarily rural, with numerous small towns, hamlets and villages throughout.

Tender fruitlands

The majority of the undeveloped lands not occupied by other environmental features are classed as good agricultural lands. A large section of land in the vicinity of Welland and much of the lands north of the escarpment are classed as tender fruit and good grape areas. These unique special agricultural lands are highly valued and should be protected.

Several significant environmental features, such as wetlands, groundwater recharge areas, watercourses, ANSI's, woodlands, ESA's and agricultural land were identified in the analysis area. A map indicating the location of these features was produced and indicated that the dispersed location of these features would allow for the location of a 100-metre right-of-way across the Peninsula without significant environmental impacts.

A.3 ASSESSMENT OF EXISTING AND FUTURE TRAVEL DEMANDS

The following section describes the existing traffic conditions on the Provincial Highway system in the Niagara Peninsula, as well as the overall approach to the

demand forecasting component of this study and the preparation of the horizon year forecasts.

A.3.1 Existing Conditions

The existing traffic conditions were reviewed for the major facilities in the Peninsula: QEW, Highway 406, Highway 403, Highway 405, Highway 420 and Highway 3.

Queen Elizabeth Way

The QEW is the only east west freeway connecting the Niagara Frontier to the GTA. The sectional characteristics (volume and growth) of the highway are shown on **Exhibit 12**.

Exhibit 13 below shows an hourly profile of the daily volume on a representative section of the QEW.

Truck volumes represent between 15% and 40% of the volume on the QEW over the day

This Exhibit shows the two-way volume on the QEW at Fruitland Road for each hour over a typical day. Auto volumes on a typical day are highest during the p.m. peak hour. Volumes remain high between 6:00 a.m. and 7:00 p.m. Truck volumes remain fairly consistent over the day, but do peak mid-day. The truck volume during the off peak periods represents between 15% and 40% of the volume on the QEW. During the peak periods, the truck volume represents 15% to 20% of the hourly volume.

Highway 406

Highway 406 is a 4-lane highway from the QEW to Beaverdams Road and is a 2 lane rural highway from there to East Main Street. The average daily traffic on Highway 406 ranges from 30,000 to 45,000 in the north and from 12,000 to 25,000 in the south.

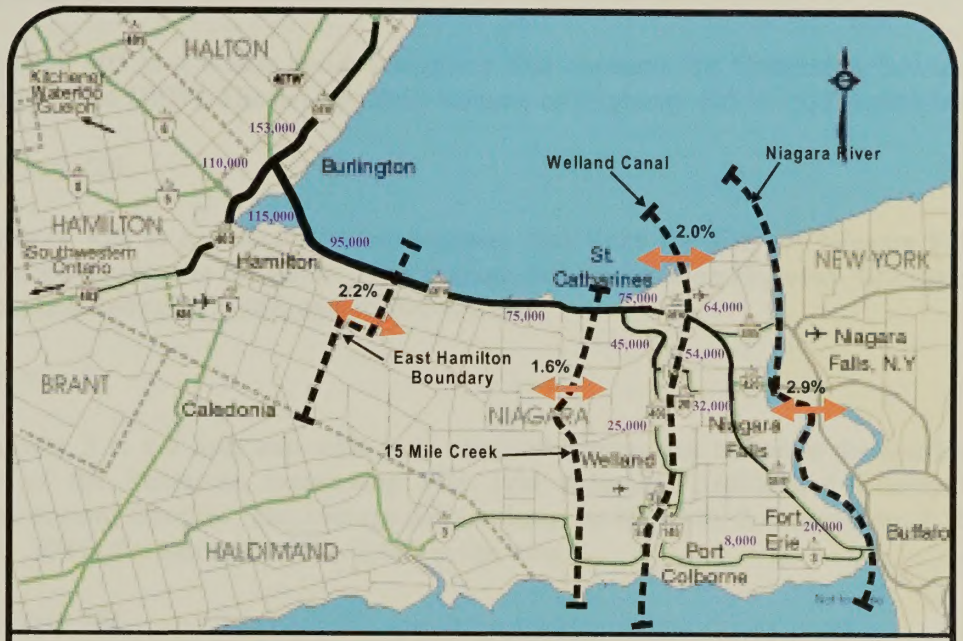


Exhibit 12: Provincial Highway Network Characteristics

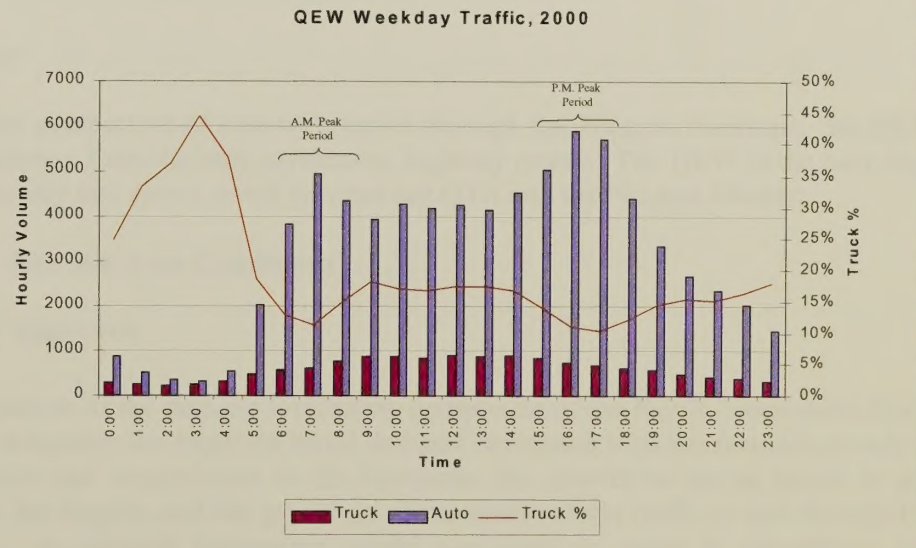


Exhibit 13: QEW Hourly Profile (Two-Way Volume at Fruitland Road

Highway 405

Highway 405 is a 4-lane divided highway that connects the Queenston Lewiston Bridge to the QEW. The average daily volume on Highway 405 is 15,000 vehicles.

Highway 420

Highway 420 is a 4 lane divided highway that links the City of Niagara Falls (Rainbow Bridge) to the QEW. The average daily volume on Highway 420 varies, by section, between 15,000 and 36,000 vehicles.

Highway 3

Highway 3 is a 2 lane east-west rural arterial/highway that traverses the southern part of the Peninsula, connecting Fort Erie to/through Haldimand County to southwestern Ontario. The average daily volume on Highway 3 ranges from 7,500 to 11,200 in the east and 4,500 - 7,500 in the west.

Highway 403

Highway 403 is an east-west divided highway that connects the QEW northeast of Hamilton to the Highway 401 east of London via Hamilton, Ancaster and Brantford. Highway 403 has a 6-lane cross section to Main Street in Hamilton and a 4-lane cross section from Main Street to the west. Highway 403 through Hamilton has an average daily volume of 90,000 to 115,500 vehicles on the 6-lane section and 40,000 to 50,000 on the 4 lane section.

Summary

From the perspective of east-west travel through the Niagara Peninsula, the QEW and Highway 3 are the only continuous highway routes. The QEW is the only high order facility that serves travel between the GTA and the Niagara Frontier.

A.3.2 Horizon Year Conditions

A.3.2.1 Approach

Future travel demand

The objective of the demand forecasting component of the Needs Assessment Study was to determine the expected travel demand associated with the forecast growth in population and employment in the Peninsula, the growth in tourist travel in and through the Region, and the growth in commercial vehicle traffic in and through the Region. A demand forecasting model was used to assist in identifying and evaluating deficiencies and to assess road and planning alternatives intended to address these deficiencies.

Forecasts for this study, derived from the model, reflected average weekday p.m. peak hour conditions and were based on population, employment, tourism and truck growth. This is consistent with previous MTO studies and the approach taken by Niagara Region in the development of their own demand forecasting model.

Forecasts for the weekday p.m. peak hour were used to calculate an equivalent horizon year design hour volume for each highway link in the area. This design hour volume was used to determine the level of service and the capacity requirements for each section of roadway. This approach is consistent with MTO practice and industry standards.

A.3.2.2 Methodology

The Ministry of Transportation maintains and continues to refine a computer based traffic forecasting tool, using the Emme/2 modelling software. The model is based upon a traditional three-step process: trip generation, trip distribution and trip assignment. This model is currently being used for all of the MTO studies being undertaken in central Ontario.

The test of a model's reliability is its level of calibration (the degree to which it replicates the pattern level of existing traffic). The base year model was calibrated to year 2000 p.m. peak hour conditions, developed from the 1996 Transportation Tomorrow Survey and base year counts ranging from 1996 to year 2000. As part of the calibration process, the base network was reviewed in detail in terms of link assumptions, such as speed, capacity, number of lanes and centroid/zone connections. Comparison of the year 2000 assigned volumes with current inventory traffic counts showed that the major screenlines were calibrated to acceptable levels and within industry standards of reasonableness.

The future base network in the model includes MTO 5-year committed and 10 to 20 year municipal programmed improvements.

Baseline forecasts were developed based on three component trip types/markets:

- Population and employment based trips (home based) for work, school and discretionary trip purposes;
- Tourist/recreation trips (non-home based)
  - To/from Niagara Falls
  - To/from international bridges;
- Commercial Vehicle trips – primarily trucks using inter-city highway network.

Population and Employment Based Trips

Population and employment based trips

Existing population and employment levels were used to determine production and attraction rates. These rates were applied to forecast population and employment levels by traffic zone to produce home based trip ends (to/from) by traffic zone. Home-based trip generation and distribution was developed based on data from the 1996 Transportation Tomorrow Survey and applied to the land uses.

Tourist/Recreation Trips

Tourist/recreation trips

Tourist based trips were developed based on information extracted from the August 2000 Passenger Vehicle Survey of the International Bridge Traffic by the Region of Niagara and the 1990 International Bridge Survey. These surveys, in conjunction

with visitation information, were used to identify the tourist component of traffic volumes in the Region of Niagara and at the international bridges.

Commercial Vehicle Trips

Commercial vehicle trips

The commercial vehicle forecasts were developed from information and relationships from the following data sources:

- 1995 MTO Commercial Vehicle Survey.
- 1999 MTO Commercial Vehicle Survey (Bridge Crossing Data Only).
- 1999 – 2000 Traffic Counts.
- Niagara Falls Bridge Commission (Queenston-Lewiston Bridge).
- NFBC - Living Plan (2000).
- Buffalo Fort Erie Bridge Authority (Peace Bridge).
- MTO permanent count station (PCS) data on the QEW at Winona and Fruitland.
- Previous Studies.
- Niagara Frontier Gateway Study.
- Peace Bridge Environmental Assessment Capacity Expansion (1996).

The 1995 MTO Commercial Vehicle Survey (CVS) database was obtained from MTO and reviewed with respect to:

- Base year traffic flows and origin-destination patterns.
- Assessment of "just-in-time" deliveries.
- Future traffic forecasts.

A twenty-eight district aggregation was developed based on MTO CVS vehicle zones and representative of 1995, 2006 and 2021 trip tables. Traffic data from the 1999-2000 MTO CVS was used to establish the year 2000 commercial vehicle control totals by corridor. The growth in traffic by corridor provided trip controls that were used to fratar the 1995 daily commercial vehicle trip table to year 2000 conditions.

Summary

Network assumptions

Forecasts were prepared for the horizon years 2011, 2021 and 2031. Model volumes were summarized for the major screenlines as well as on a link by link basis for the major corridors (QEW, Highway 406, Highway 403, Highway 405, and Highway 420)

A.3.3 Future Travel Demand

Future demand is dependent on a variety of socio-economic factors. The various components of the area traffic are dependent on different aspects of the economy and demographics of the analysis area. Growth in the area traffic was segregated by the different markets in the volume flow: population and employment based auto trips, tourist/recreation based auto trips, and international/interregional commercial vehicles.

Population and Employment Base Trips

1.2% per annum growth rate for auto trips

Growth in the population and employment based trips is dependent on the growth in area land use assumptions for population and employment. As described earlier, land use forecasts for the area were developed based on current Official Plan targets. Based on these projections an overall growth rate of 1.2% was calculated for home based trips.

Tourist Trips

Tourist based trips were divided into two types: i) to/from Niagara Falls and ii) to/from the Niagara Frontier International Bridges. The growth in these components of traffic was determined based on the regression analysis of past trends in volume and visitation against growth in population and variation in the value of the Canadian dollar relative to the American dollar. The result was a range in growth projections dependent on a range of anticipated economic conditions. **Exhibit 14** depicts a summary of the results of the regression analysis performed to determine international traffic growth.

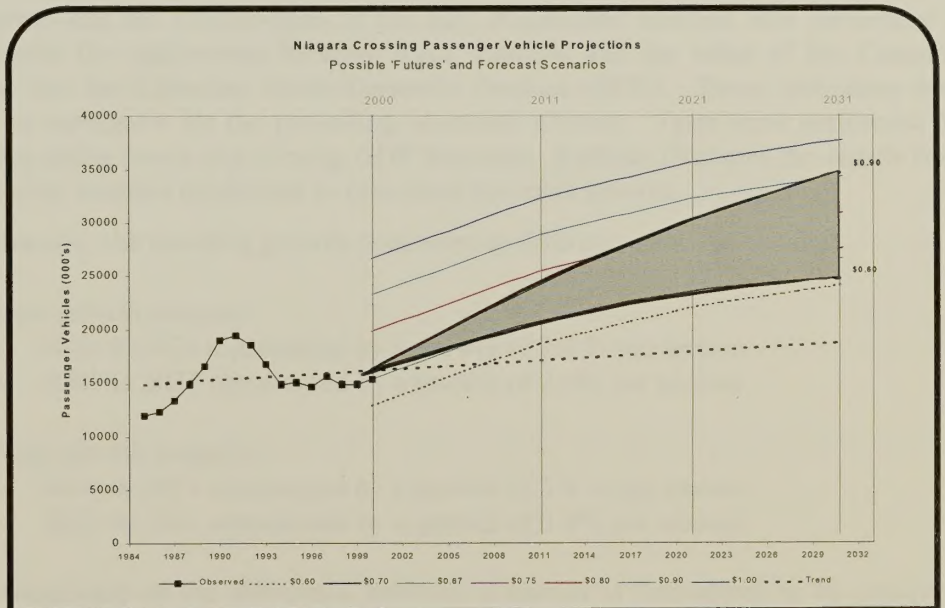


Exhibit 14: Niagara Bridge Crossing Growth - Passenger Vehicles

Visitation to increase to 22 million in 2031

In summary, the following growth rates were developed for tourist activity:

- Auto traffic(2021/2031) on the Niagara Bridges
  - The high scenario (low value of Canadian dollar) represents a growth of 2.7%/3.4% per annum.
  - The low scenario (high value of Canadian dollar) represents a growth of 1.6%/1.9% per annum.

- Visitation (2021/2031)
  - The base visitation scenario (7 million new visitors) represents a growth of 0.7% per annum (for both horizons).
  - The high visitation scenario (25 million new visitors) represents a growth of 3.6%/4.1% per annum.
- Visitation to Niagara Falls
  - Existing visitation is split 66% U.S. versus 34% Canadian. In the future, the trend is expected to shift in favour of the Canadian share because of the low growth of population and employment on U.S. side. While U.S. levels are likely to hold steady, the Canadian levels are expected to increase significantly which would result in a change in the distribution. It is estimated that in the future, the distribution will be more equal between U.S. and Canadian visitors (i.e. 50/50).

Commercial Vehicle Trips

Truck growth rate 3% per annum

Commercial vehicles have shown significant growth on the international bridges over the past 10 years. The future for truck volumes, size and commodity types, are hard to predict beyond the next 5 years as this market is very sensitive to the economy and the technologies of the day. Regression analysis was performed to determine the relationship between truck volumes and the value of the Canadian dollar and the Canadian Gross Domestic Product (GPD). These indicators were used as surrogates for the prevailing economic climate. Tests were performed for varying dollar levels and varying GDP forecasts. **Exhibit 15** shows the results from regression analysis performed to determine the truck growth.

In summary, the resulting growth rates were as follows:

- Low growth scenario:
  - Now to 2021 represented by a growth of 2.4 % per annum.
  - 2021 to 2031 represented by a growth of 2.6% per annum.

- High growth scenario:
  - Now to 2031 represented by a growth of 3.4 % per annum.
  - 2021 to 2031 represented by a growth of 3.2% per annum.

The magnitude of the difference between scenarios is considered to be relatively small. A growth rate of 3% per year was assumed as a "medium" growth scenario.

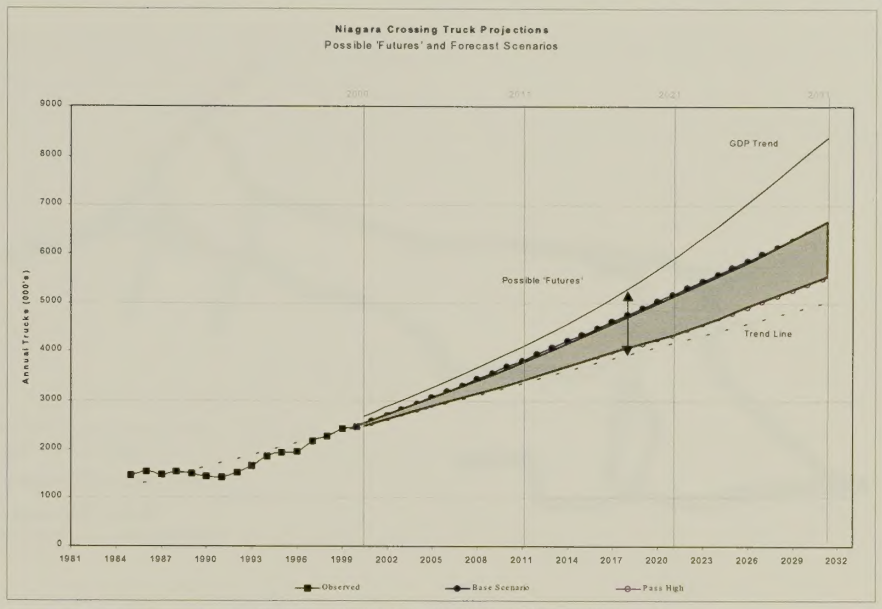


Exhibit 15: Niagara Bridge Crossing Growth - Commercial Vehicles

A.3.4 Identification and Assessment of Transportation Problems

Level of service

Level of Service (LOS) is a measure used to describe the operating characteristics of a roadway section over a one hour period during peak usage. LOS is typically related to the ability of the roadway to accommodate the volume load during the peak period use. The roadway LOS's has been grouped into categories and are expressed as a range of values A through F as follows:

Level of Service	Operating Characteristics
A-C	Free flow operation; uncongested
D	Acceptable operation, but approaching unstable operating conditions
E-F	Unacceptable; congested

The design hour volumes for the provincial links in the analysis area were evaluated based on the calculated Level of Service.

Level of Service E is considered by MTO to be the threshold at which facilities are identified as being capacity deficient.

A.3.4.1 Existing Transportation Deficiencies and Effects

In order to identify existing transportation deficiencies using the model, volume-to-capacity (v/c) ratios were calculated for the significant highway links in the network. **Exhibit 16** shows the volume to capacity (v/c) ratios for the highway links in the analysis area.

Exhibit 16: Year 2000 - Existing Network - Design Hour - Volume to Capacity

The 2000 Level of Service analysis for the provincial Highway system serving the Hamilton and Niagara Area indicates the following:

- QEW
  - The 8-lane QEW from Hwy 403 to Burlington Street (Burlington Bay Skyway) is operating at LOS D.
  - The 4-lane QEW from Highway 406 to Niagara Street (through St Catharines) is currently operating at LOS D.
- Highway 406
  - The 4-lane section between Highway 58 and Geneva Street is operating at LOS D.
- Highway 403
  - The 4-lane section between Aberdeen Road and Highway 6 is operating at LOS D.

The following is noted regarding the performance of the network:

- Average speed in the network is 56.4 km/h. Average speed on the Provincial facilities in Niagara is 64.3 km/h and 68.4 km/h on the Provincial facilities in Hamilton.

- 3.2% of the road network in Hamilton and Niagara operates at LOS E-F. The proportion of Provincial facilities operating at LOS E-F is 8.5% in Niagara and 3.7 % in Hamilton.

A.3.4.2 Year 2031 Transportation Deficiencies and Effects

Exhibit 17 shows the forecasted volume to capacity (v/c) ratio for the highway links in the analysis area in 2031.

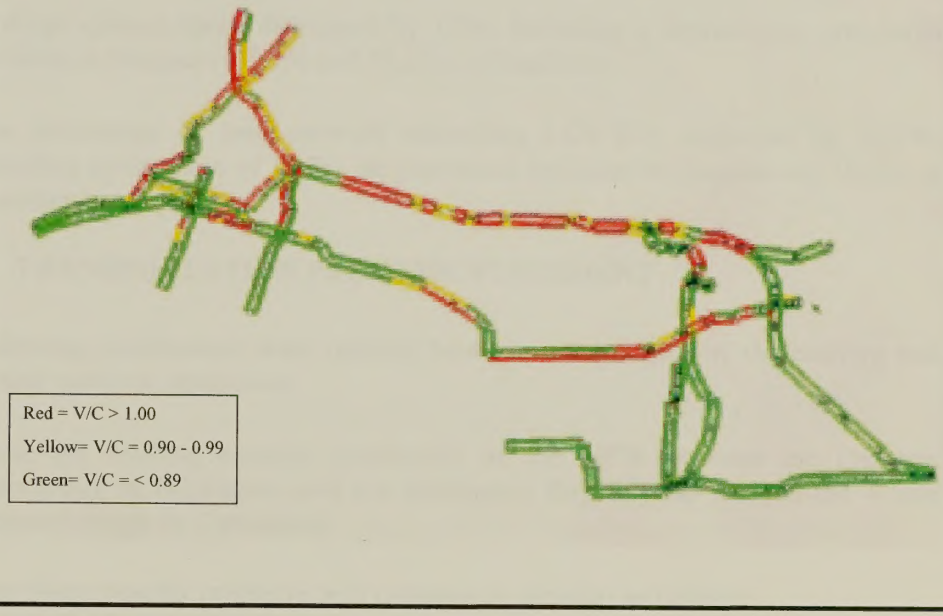


Exhibit 17: Year 2031 - Base Network
Design Hour - Volume to Capacity

The level of service analysis for Year 2031 indicates the following:

- QEW
  - The 8-lane QEW from Hwy 403 to Burlington Street (Burlington Bay Skyway) is expected to operate at LOS E-F.
  - A 6-lane QEW from Burlington Street to Highway 406 is expected to operate at LOS E-F.
  - A 6-lane QEW from Highway 406 to Niagara Street (through St Catharines) is expected to operate at LOS E-F.
  - A 6-lane QEW from Niagara Street to Highway 405 is expected to operate at LOS E-F.
  - A 4-lane QEW from Mountain Road to Highway 420 is expected to operate at LOS E-F.
- Highway 406
  - The 4-lane section between Highway 58 and Geneva Street is expected to operate at LOS E-F.
  - The 4-lane section between Highway 20 and Highway 58 is expected to operate at LOS E-F.

- Highway 403
  - The 6-lane section between Aberdeen Road and QEW is expected to operate at LOS E-F.

From a network perspective, the following changes in system performance by 2031 were noted:

- Average system speed decreased by 15%, including a decrease on provincial facilities in Niagara of 7.9% and 21.2 % in Hamilton.

- The percentage of road network exceeding LOS E-F increased by 11.7%, including an increase of 11.8% on provincial facilities in Niagara and 16.4% in Hamilton).

A.4 TRANSPORTATION PROBLEM STATEMENT

The following conclusions were reached based on the analysis of the existing and future base network conditions:

Existing constraints

- There are existing capacity constraints on the QEW between the Freeman Interchange in Burlington and the Burlington Bay Skyway and on the 4-lane section through St. Catharines.

Near term constraints

- Near term capacity problems will continue or develop as follows::
  - Burlington Bay Skyway to Freeman Interchange.
  - 6-lane QEW through St. Catharines.
  - Highway 403 between QEW and the Lincoln Alexander Parkway (3 lanes W/B, 2 lanes E/B).
  - 4 lane Highway 406 between Highway 58 and Geneva Street.

Long term constraints

- Additional capacity problems will occur in the longer terms as follows:
  - 6-lane QEW between Burlington Street in Hamilton and Highway 406 in St. Catharines.
  - 4 lane QEW between Mountain Road and Highway 420 in Niagara Falls.

An east-west capacity deficiency has been identified in the Niagara Peninsula

Today, there are capacity constraints on the QEW during the design hour between the Burlington Bay Skyway and St Catharines. The widening of the QEW from 4 to 6 lanes through St Catharines would provide some short term relief to this problem. Additional capacity in the QEW corridor is required in the near term (i.e. by 2011).

In considering the opportunities for additional capacity in the QEW corridor through Niagara Region, it is important to recognize the capacity constraints in the Hamilton highway network, especially Highway 403 and the QEW Burlington Bay Skyway.

The current and anticipated transportation issues are depicted in **Exhibit 18**.

Exhibit 18: Existing and Future Transportation Deficiencies

A.5 IDENTIFICATION OF OPPORTUNITIES

The review of outlooks relative to trade, tourism and land use and development, combined with an assessment of current transportation operations and existing environmental constraints and opportunities, has led to the identification of a number of opportunities specific to the Niagara Peninsula Transportation Needs Assessment. These opportunities are summarized below:

Environmental

Environmental - Preservation of Natural Resources

The Region of Niagara have concerns about future expansion of the QEW relative to physical and proximity impacts on the tender fruitlands. It is considered by the Region that, expansion of the QEW will result in development pressure on these lands.

There is an opportunity for the examination of municipal legislative and policy controls that can be put in place to protect and preserve the tender fruitlands.

The above issues provide an opportunity to initiate the development of a transportation improvement plan that contains both structural and non-structural travel demand management, transportation systems management and intelligent transportation systems (TDM, TSM and ITS) elements to minimize impacts and pressures along the QEW through strategic upgrading, management of travel demand and development of other provincial, and municipal, infrastructure to reduces pressure on the QEW and the adjacent lands.

An overview of review to environmental issues and constraints south of the QEW between Halton and Niagara indicates that there appears to be no critical environmental "flaws" or "issues" that may preclude the development of a new transportation corridor. This review was limited to examination of secondary source material and field investigation. Further detailed environmental work is required to confirm this.

This presents an opportunity to address travel demand through the creation of a new transportation corridor linking the QEW in Niagara, and Hamilton or Halton.

Land Use Development

Land Use and Development

Niagara and Hamilton will continue to experience population and employment growth to the 2021 and 2031 planning horizons, and beyond. Both the City of Hamilton and the Region of Niagara are currently undertaking Official Plan updates that will identify the nature and spatial location of future growth. In addition, this study has revealed that there are opportunities for growth in both areas beyond that contemplated in current Official Plan documents as a result of congestion related issues in the GTA.

Niagara and Hamilton - growth to the south

Given physical constraints to growth in the analysis area (Lake Ontario, Niagara Escarpment, QEW, etc.), both the City of Hamilton and the Region of Niagara wish to encourage growth to the south of the escarpment in areas around Hamilton International Airport, Thorold, Welland and Port Colborne. In addition, within Niagara, the Region has aspirations for growth in industry and tourism in Niagara Falls.

These issues present an opportunity to facilitate growth in a manner that reflects the provincial principles and objectives relating to Smart Growth. In order for this to occur, improved levels of accessibility must be provided to anticipated growth areas. Improved accessibility could be provided through the implementation of both structural and non-structural initiatives, i.e. a multi-modal transportation plan.

Niagara economy highly dependent on tourism

Within Niagara, the economy is highly dependant on tourism, including visitation to Niagara Falls, the Wineries, Niagara-on-the-Lake and other attractions within the area. In order to facilitate growth in all of these markets, improved accessibility is required, and in particular, the addressing of travel constraints during both weekday and weekend periods. Congestion affects both the physical ability of visitors to reach the area, and the perception that visitors have of the area in terms of high quality, efficient transportation services. These issues present opportunities relating to the development of infrastructure that potentially includes expansion of the highway and public transportation systems.

Niagara and Hamilton - aspire to create more job opportunities

Both Niagara and the City of Hamilton aspire to encourage a greater number of employment opportunities. This includes areas around Hamilton International Airport, Welland, Port Colborne, St. Catharines, and Niagara Falls. To encourage new job opportunities through the attraction of new industry, there are many factors that must be addressed. One factor is the quality of transportation accessibility to the area, reflected by the efficiency of the transportation system and the ability of the

system to adequately link development areas. Opportunities in this regard relate to the provision of new infrastructure including the potential for a new transportation corridor connecting Hamilton to Niagara paralleling the QEW, improved accessibility to potential employment areas by other modes of transport, and upgrading the municipal road and transit networks.

Significant Trade Corridor

Trade

The QEW linking Fort Erie and Niagara Falls to Hamilton and the GTA represents a significant trade corridor that is vital to economic prosperity in Ontario. The high volume of commercial vehicles on the QEW contributes to congestion and operational issues during periods of heavy demand, or when incidents have occurred.

The significance of the Niagara Peninsula as a trade corridor and the location and quality of existing infrastructure suggests opportunities to provide alternate routes and modes for goods movement. Additional infrastructure combined with increased capacity in the system will improve the efficiency and effectiveness of the system and reduce costs associated with moving goods through the area.

Use of Existing Rights-of-Way/Facilities

Existing Facilities

Between Hamilton and St. Catharines, the QEW right-of-way can accommodate a basic eight lane cross-section. This provides obvious opportunities to expand the highway from 6 to 8 lanes in a cost-effective manner.

There are other amenities and facilities in Hamilton and Niagara that provide opportunities relating to the expansion of passenger and goods rail services and passenger ferry services. Existing rail lines and harbour/docking facilities provide opportunities to increase the level of service provided on alternate modes through the corridor.

Highway 407 West (between Highway 403 in Mississauga and the QEW in Burlington) through Halton is scheduled to open to the QEW in 2001. This facility provides a freeway alternative to the QEW through Halton. An opportunity may exist to extend the freeway beyond Halton to Hamilton and Niagara to increase the length of freeway that parallels the QEW.

Innovation/ technology
***TSM** - Transportation Systems Management*
***TDM** - Travel Demand Management*
***ITS** - Intelligent Transportation Systems*

Innovation/Technology

Existing travel patterns and congestion levels suggest significant opportunities for the implementation of innovative strategies and technologies to manage the transportation system, reduce auto use, move goods more efficiently and provide high levels of information to system users relative to conditions at border crossings, congested routes, etc. In this regard, there are opportunities that relate to the implementation of TDM, TSM and ITS strategies within the analysis area.

Future Rehabilitation Improvement Requirements

Rehabilitation

Currently, long distance travel through the analysis area is generally accommodated on the QEW. Some areas of the QEW currently experience, or will experience congestion and there are no alternate routes to use during these periods or when incidents occur on the highway. In addition, maintenance rehabilitation activities and reconstruction or widening, result in significant delays to users which impacts visitors, goods movement and local commuting activities. In particular, the Garden City Skyway in St. Catharines presents a significant challenge in terms of future maintenance and rehabilitation requirements. Opportunities to address these issues include the use of Highway 406, Highway 58 to the Thorold Tunnel and a new freeway link to Niagara Falls, using the existing tunnel and a connection to Niagara Falls via a new Highway 420 Extension.

The potential extension of Highway 420 will also provide an opportunity to defer the need for widening of the QEW through St. Catharines beyond the planned 6-lane cross-section.

Prevailing Travel Patterns

Travel patterns

Travel in both Niagara and the City of Hamilton is characterized by a high percentage of daily trips that are made locally, versus trips that travel outside the communities (see **Exhibit 19**). This presents opportunities for reducing auto use and increasing the use of other modes, including transit, walking and cycling. A significant amount of local traffic in both St. Catharines and Hamilton uses the QEW, which has an affect on long distance travel, goods movement activities and the number of visitors who may wish to travel to the area.

Highway User Safety

Safety

Highway user safety through the corridor for autos and commercial vehicles may be enhanced through the provision of additional capacity, reduction in travel demand and the implementation of state-of-the-art technology to provide or produce user information, weigh-in-motion facilities, congestion management, etc.

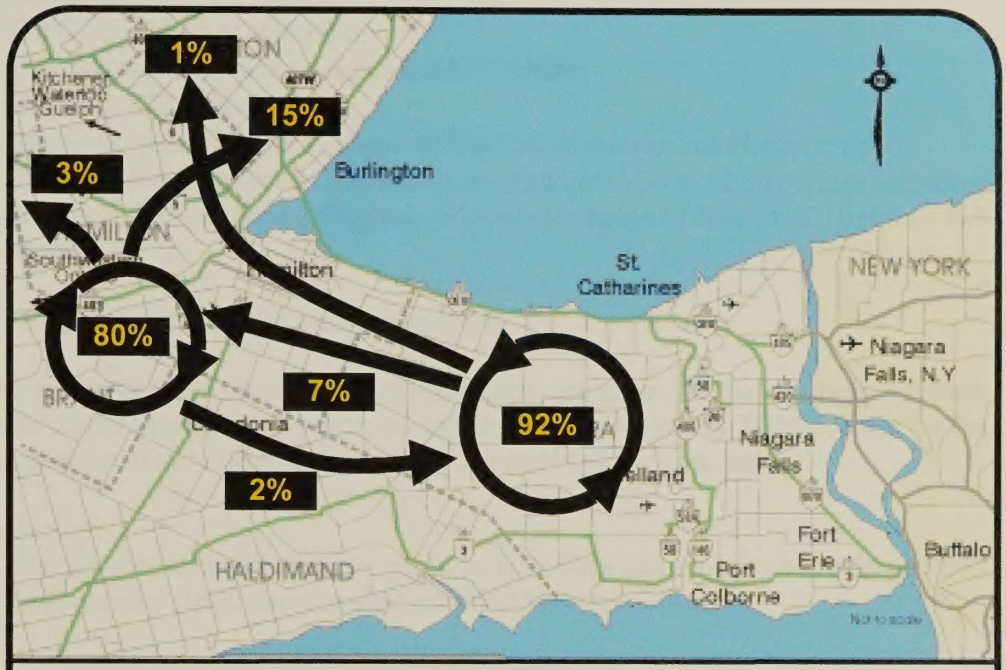


Exhibit 19: Niagara/Hamilton Home Based Trips – Trip Distribution

Revenue Generation and/or Cost Reduction

Revenue generation

As funds for expansion of transportation systems are limited, there is a need to expand and provide new facilities in a cost-effective manner. This is consistent with the smart growth principles of the government. In this regard, opportunities may develop to effect road pricing strategies to make new facilities financially self-sustaining or to reduce the public cost associated with the provision of significant pieces of new infrastructure.

A.5.1 Assessment of Opportunities

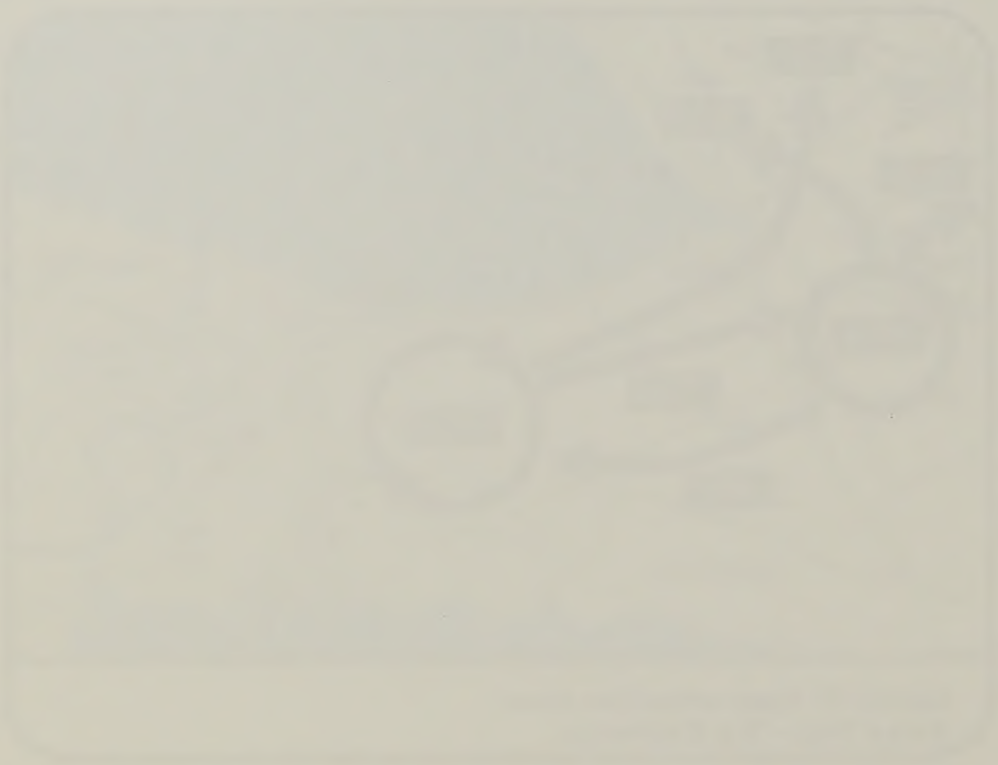
A significant number of opportunities exist relative to the provision of transportation services within the analysis area. Opportunities have been stratified into the following categories:

A. Roadways.
B. Transportation Systems Management.
C. Travel Demand Management and Transit.
D. Passenger Rail Service.
E. Ferry Service.

Within these categories the following opportunities exist:

Roadways

A. Roadways



Opportunities:

- QEW upgrading or widening;
- Development of a new Mid-Peninsula Corridor;
- Highway 420 Extension;
- Improved regional road linkages within both Hamilton and Niagara; and
- Other provincial highway improvements to address accessibility issues including Highway 406 Extension, Highway 6 Extension south of Hamilton, Highway 403 upgrading.

TSM

B. Transportation System Management

TSM initiatives are intended to optimize the operation of the roadway network (traffic signal timing, intersection improvements, etc.) whereas TDM focuses on the management of travel (i.e. influencing when and how trips are made.)

Opportunity:

- The development of strategic plans in Hamilton and Niagara to address TDM opportunities, including the application of ITS techniques.

TDM and Transit

C. Travel Demand Management and Transit

TDM can simply be defined as strategies that are implemented for the purpose of improving the operation of the transportation system by managing the demand side of the travel equation and is done without the provision of major roadway infrastructure expansion. The term TDM, encompasses alternatives to driving alone and the measures or techniques that encourage the use of these alternate modes.

Opportunity:

- The use of innovative strategies to accommodate local and inter-municipal and inter-regional transit requirements in Niagara and Hamilton and the development of TDM plans to address opportunities to reduce local auto use.

Passenger rail service

D. Passenger Rail Service

Opportunity:

- Increased passenger rail service particularly for tourist, between the GTA and Niagara.

Ferry service

E. Ferry Service

Opportunity:

- Increased ferry services/capacity between Toronto/GTA and the analysis area.

B. TRANSPORTATION PLANNING ALTERNATIVES

B.1 IDENTIFICATION OF TRANSPORTATION PLANNING ALTERNATIVES

Transportation Alternatives:
- *"Do Nothing"*
- *Road Improvements*
- *Rail Improvements*
- *Air Transport Improvements*
- *Marine Transport Improvements*
- *Municipal Transit Services Improvements*
- *Travel Demand Management*
- *Transportation System Management*

The needs assessment examines all travel needs - commuter, tourist and goods movement - in identifying long term problems and opportunities; and considers all modes - rail, road, marine and air as possible options to improve the overall transportation system. The list of planning alternatives builds on the opportunities identified in Section A.5.1

The transportation needs assessment process involves consideration of how proposed transportation planning alternatives meet the study goals and objectives. Reasonable options that meet the mobility and economic goals are carried forward into the Transportation Development Strategy. Roadway alternatives are then assessed in more detail in terms of transportation, economic and environmental considerations. **Exhibit 20** shows the process employed and the improvement options considered as part of producing a Transportation Development Strategy.

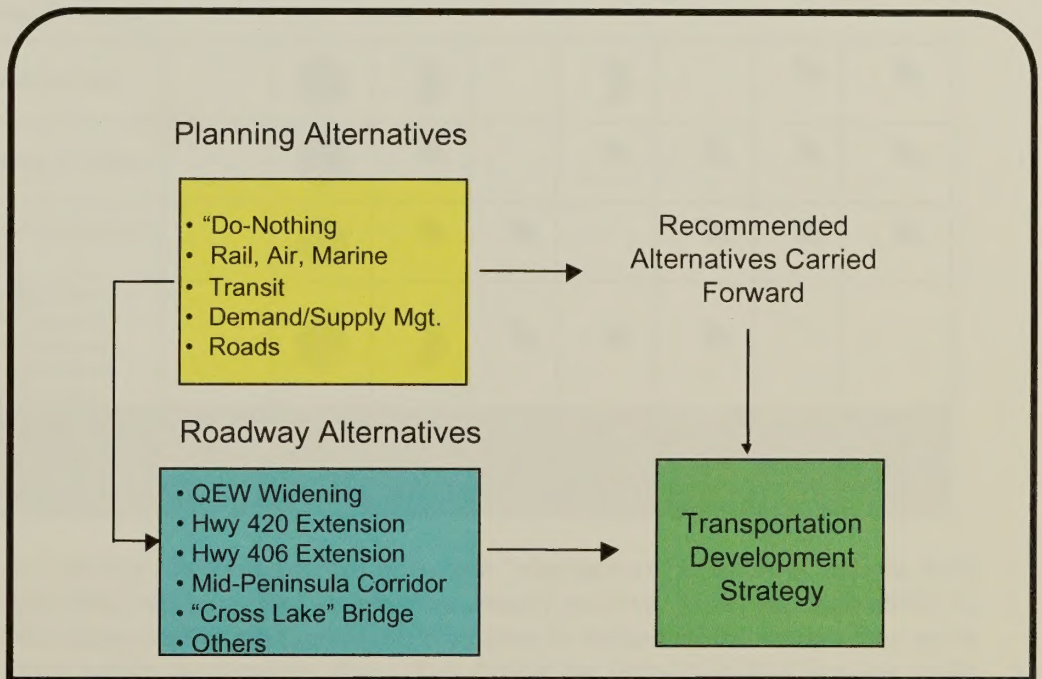


Exhibit 20: Possible Transportation Alternatives

Based on the study goals and objectives, and in response to identified problems and opportunities in the analysis area, a set of transportation planning alternatives was identified for further assessment and evaluation. These planning alternatives are depicted in **Exhibit 20**.

B.2 ASSESSMENT AND EVALUATION OF TRANSPORTATION PLANNING ALTERNATIVES

The transportation planning alternatives were assessed and evaluated using transportation, economic development and environmental criteria.

Table 1: Evaluation of Transportation Planning Alternatives

CRITERIA	Do Nothing	Road	Rail	Air	Marine	Transit	TDM	TSM
Transportation								
Movement of people through the analysis area	○	●	◔	○	◔	◔	◔	◔
Movement of goods through the analysis area	○	●	◑	◔	◑	○	◔	◔
Transportation Ranking	**8**	**1**	**2**	**7**	**3**	**6**	**3**	**3**
Economic Development								
Supportive of trade	○	●	◑	○	◑	○	◔	◔
Supportive of tourism	○	●	◔	○	◔	◔	◔	◔
Supportive of land use growth	○	●	◔	◔	○	◔	◔	◔
Interconnection of regional economic centres, designated growth areas and border crossings	○	●	◑	◔	◔	◔	○	○
Economic Development Ranking	**8**	**1**	**2**	**7**	**3**	**4**	**4**	**4**

Legend:

○ *Worst*

● *Best*

The rail, marine (ferry) and transit passenger "alternatives" to roadway options have inherent modal attributes that are environmentally positive. However, their ability to meet the transportation and economic objectives is limited by the market they serve and usage within the Analysis Area. Rail freight has been identified as a key mode in the movement for goods accounting for one-third of freight shipped through the Niagara gateway. It is assumed that rail freight will hold this market share. Travel Demand Management (TDM) strategies to reduce travel of shift auto users to other modes are environmentally positive. Transportation Systems Management (TSM) focuses on optimization of the existing infrastructure and more efficient traffic flow – again environmentally positive. These will be discussed in the next session.

As no new corridors are required for the alternatives, other than "roadways", no environmental feasibility analysis of the non-roadway options is required.

B.3 SELECTION OF PREFERRED TRANSPORTATION ALTERNATIVES

Several alternatives required to satisfy demands

In order to satisfy the study goals and objectives, including addressing basic transportation demand (the movement of people and goods), it was clear from the evaluation process, and traffic analysis conducted in parallel with the evaluation, that several of the planning alternatives, implemented in concert will be required to resolve future transportation constraints and address travel demand within the analysis area. However, it is also clear that, the only planning alternative that could practically accommodate a significant amount of increased demand for travel is the road network alternative. The road alternative has been identified as the most effective at addressing the transportation goals and mobility demands and provides the highest overall level of "support" to the economic development assessment criteria. The degree to which infrastructure improvements can avoid sensitive environmental features would require a more detailed assessment of route and design alternatives.

In terms of satisfying travel demand for people and goods, a multi-modal approach provides choice for travelers and offers viable mechanisms to reduce auto use. However, transit, rail, ferries, etc. cannot address the diverse user needs nor significantly alleviate QEW traffic congestion.

1996 - 200 commuters by rail - Niagara

The Transportation Tomorrow Survey (TTS) data (1996) indicates that approximately 200 people commute by rail from the Niagara Region to the GTA on a daily basis. Estimates indicate that if a 5% market share is achieved (based on a similar GO Transit market share from other hinterland communities), approximately 600-700 commuter trips (one-way) by rail (ferry or inter-city bus) would be made between Niagara Region and the GTA in 2031.

2031 - 600-700 commuters by rail - Niagara

Exhibit 21 below shows person trip demand by travel mode for the p.m. peak hour (commuter trips) between Niagara Region and areas to the west, including Hamilton, the GTA and the City of Toronto (Downtown) and also provides an indication of how trips (modal use) are made today, and will be made in 2031. The graphic also indicates that the potential market for new or upgraded rail, ferry or inter-regional bus service today, is limited. Even if transit use in the future exceeds 5% of all trips, it would not result in the resolution of anticipated system or corridor capacity deficiencies.

Exhibit 22 indicates the person trip linkages that offer potential for additional ferry, rail or inter city bus service. It is noted that these modes would compete for ridership, potentially compromising the ability of any one mode to be financially self-sustaining.

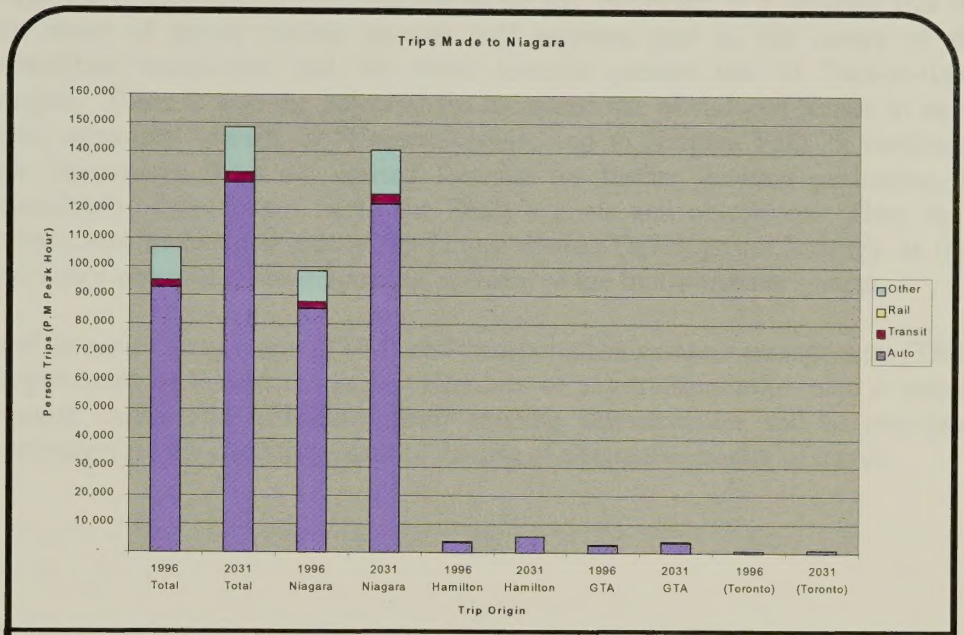


Exhibit 21: Person Trip Linkages by Origin and Travel Mode

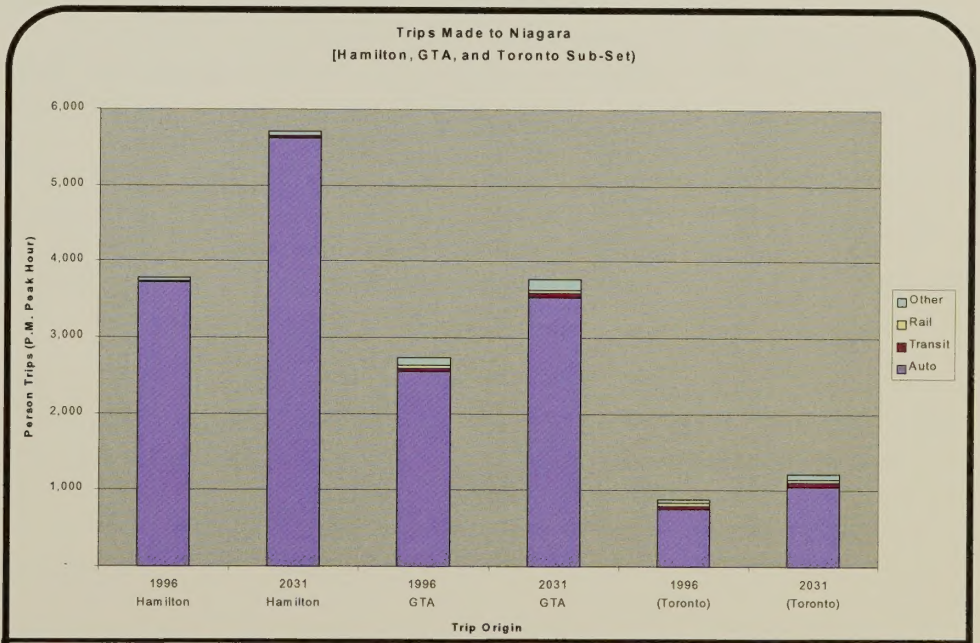


Exhibit 22: Person Trip Linkages by Origin and Travel Mode - (Ferry, Rail or Inter City Bus Market Potential)

The selection of the road network alternative as the primary means of dealing with future travel demands within and through the analysis area should not result in the importance of the other transportation modes being downplayed. Rail and marine modes currently play an important role in the movement of high volume goods

through the Peninsula and will continue to do so. However, it is unlikely that the mode share of goods moved by rail will increase due to the nature of the commodities transported and the trend towards greater use of "just-in-time" strategies. There is also the potential for increased use of rail and ferries to move people, especially tourists to Niagara Region, and to Niagara Falls in particular. These alternatives were not carried forward for further detailed evaluation, as independently, they do not fulfill the Study's goals and objectives. They have, however, been included as part of the Transportation Development Strategy, as they do provide a necessary, but supporting, element of the transportation system.

Travel demand management (TDM) and transportation systems management (TSM) strategies must be considered as key elements of any transportation plan to ensure maximum safety and efficiency from existing infrastructure and to maximize opportunities for the encouragement of the use of alternative modes of travel.

C. ROADWAY ALTERNATIVES

C.1 IDENTIFICATION OF ROADWAY ALTERNATIVES

Roadway alternatives

The assessment and evaluation of transportation alternatives revealed that a road-based solution be carried forward for further analysis to determine the specific improvements that may be required within the analysis area. In identifying a "long list" of potential roadway alternatives, the following criteria was used:

- The road solution should satisfy long term travel demands through the analysis area;
- Freeway type standards and capacity would apply, either in upgrading existing facilities or in design of a new corridor.

The following long list of road network alternatives was subsequently identified for assessment and evaluation:

Mid-Peninsula Corridor

- A new Mid-Peninsula Corridor - 5 basic alternatives and 1 sub-alternative were defined on the basis of: road network findings and recommendations from prior transportation studies; Official Plans of the area municipalities; and current transportation and planning perspectives and future outlooks;

QEW widening

- QEW widening from Freeman Interchange to Highway 420;
- QEW widening from Freeman Interchange to Highway 406 plus Highway 420 Extension from the QEW to the Thorold Tunnel; and

Cross-lake bridge

- A new "Cross-Lake" Bridge providing a direct connection between Niagara and Toronto.

Exhibit 23 shows the road network alternatives considered as part of the assessment process.

The Mid-Peninsula Corridor alternatives are depicted in **Exhibits 24** to **29**. In simple terms, the corridors were common across much of the escarpment between Hamilton and Niagara but varied according to the east and west terminus locations: in the east the MPC would connect to the QEW at Niagara Falls or further south toward Fort Erie; in the west the MPC would connect to the south or west side of Hamilton via the existing highway network, or to the Highway 407 on the east side.

Exhibit 23: Road Network Alternatives

Exhibit 24: MPC - Alternative A

Exhibit 25: MPC - Alternative B1(B2)

Exhibit 26: MPC - Alternative C

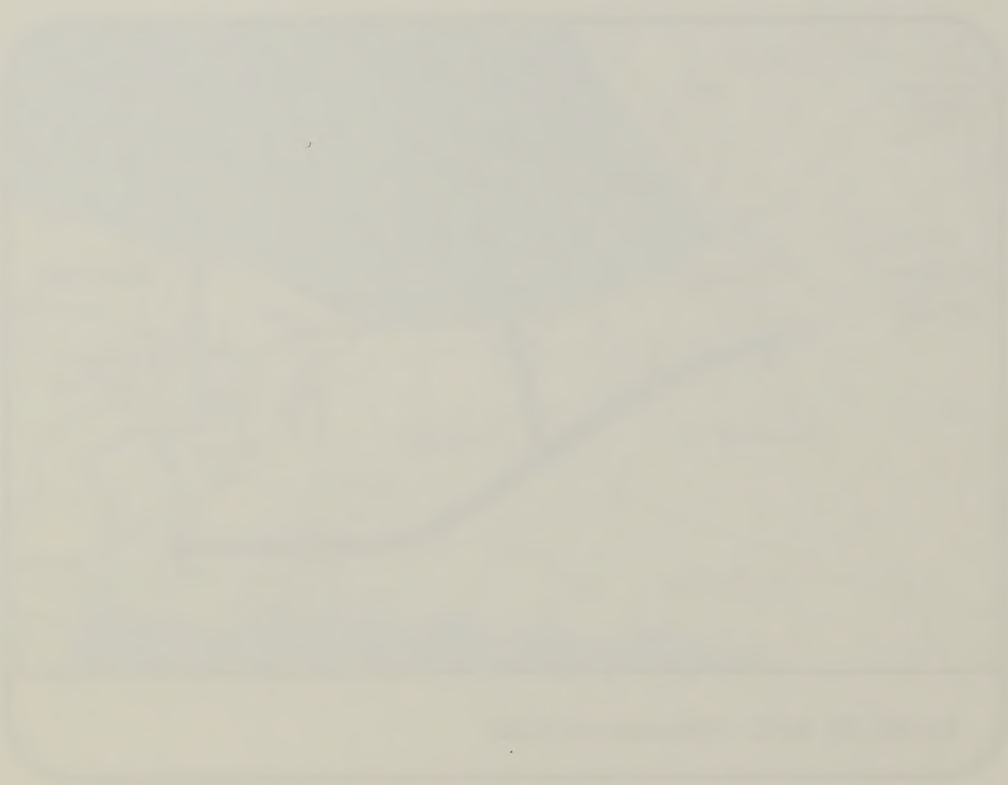


Exhibit 27: MPC - Alternative D1

Exhibit 28: MPC - Alternative D2

Exhibit 29: MPC - Alternative E

C.2 ASSESSMENT AND EVALUATION OF ROADWAY ALTERNATIVES

C.2.1 Assessment and Evaluation of Long List of Roadway Alternatives

An assessment process was applied to this long list of alternatives to "screen out" those options that failed to adequately satisfy the study transportation goals and objectives. The following performance measures were used:

1. ***Network Performance Indicators:***

- Travel Speed
- Delay and reliability measured by v/c
- Diversion from QEW
  - Auto
  - Truck

2. ***Critical Link Performance Indicators:***

- Peak hour v/c in 2031
  - QEW Burlington Bay Skyway;
  - QEW St. Catharines;
  - Highway 403 from QEW to the "Linc".

3. ***Other Factors***

- Use of Existing Infrastructure
- System Connectivity (a measure of the interconnection of regional economic centres, designated growth areas and border crossings)

Alternatives were compared to the "Do Nothing" alternative, which is the base network, plus planned improvements, including the Highway 406 extension, Highway 6 New, and widening of Highway 403 in Hamilton. Those alternatives that best satisfied the transportation needs and addressed capacity deficiencies were carried forward for a more rigorous assessment and evaluation.

Table 2 below provides a summary of the evaluation of the long list of transportation alternatives.

Table 2
Summary Evaluation of Transportation Criteria –
Long List of Roadway Alternatives

Criteria / Sub Factors	Do Nothing	QEW (8 Lanes)	QEW Plus Hwy 420	Cross Lake Bridge
Network Performance	○	◔	◔	◑
Link Performance	○	◔	○	◔
Use of Existing Infrastructure	○	◕	◑	○
System Connectivity	○	◔	◔	○
Overall Assessment	10	6	8	9

Criteria / Sub Factors	MPC "A"	MPC "B"	MPC "C"	MPC "D"	MPC "D2"	MPC "E"
Network Performance	◑	◑	●	◕	●	◕
Link Performance	◔	◑	◕	◕	◕	◕
Use of Existing Infrastructure	○	○	○	○	○	○
System Connectivity	◑	◑	●	◕	●	◕
Overall Assessment	6	5	1	3	1	3

Legend:

○ *Worst*

● *Best*

The evaluation allowed several of the potential roadway alternatives to be "screened out" for failure to address critical transportation network and link performance criteria:

Do nothing - fails to address travel demand

- The do nothing option does not address current or future system problem issues.
- The traffic analysis conducted in conjunction with the assessment/evaluation indicated that a combination of roadway improvements in the analysis area might be required to address corridor and specific capacity improvements.

- The MPC alternatives (MPC A and MPC B) terminating east of Hamilton do not resolve congestion issues across the Burlington Bay Skyway and through the Freeman Interchange, and provide no relief to Highway 403 in Hamilton. They rely on connecting to existing north-south links in Hamilton that will be unable to accommodate the additional demand and are unlikely to be expandable (Highway 403 down the escarpment; Red Hill Creek Expressway). These options were therefore not carried forward for further detailed assessment. In effect, these alternatives did not address the anticipated east-west capacity deficiency across the Peninsula.

- MPC alternative D was screened out on the basis of its inability to divert long distance truck and auto traffic from the QEW. The section of the MPC between the QEW and Welland would carry mostly "local" traffic, essentially diverted from the municipal road system. A review of this alternative revealed some deficiencies in the municipal road network and suggested that a future linking of Welland, Port Colborne, Thorold areas to Niagara Falls, should be considered. This municipal link should also connect to the MPC.

- MPC alternative E was screened out on the basis of its inability to divert both auto and truck traffic from the QEW. In addition, sections of alternative E use existing local roadways through Welland and an existing Welland Canal tunnel crossing, limiting the capacity of this section and making tolling of these sections infeasible.

- The widening of the QEW in combination with the Highway 420 Extension between Highway 420 in Niagara Falls and the Thorold Tunnel does not satisfy cross-peninsula travel demands (i.e. resolve future capacity deficiencies) or provide relief to the congested freeway network in the Hamilton area. It was therefore screened out from further detailed assessment. The importance of this option in creating an alternate route to the QEW through the St. Catharines area is recognized, especially in consideration of the planned redecking of the Garden City Skyway and during periods of congestion on the QEW in St. Catharines. Combined with appropriate ITS strategies on the freeway system, the Highway 420 Extension has the potential to play a role in the provincial network.

- The cross-lake bridge alternative was screened out as it failed to address the freeway deficiencies in the Hamilton area, and would not preclude the need for additional east-west freeway capacity in the Niagara Peninsula. Additional study would be required to assess the true long-term value of this option.

The following alternatives were carried forward for detailed assessment:

- Mid-Peninsula Corridor Alternatives "C" and "D2" have common routes from Highway 407, around the west side of Hamilton, and across the escarpment to the west side of Welland. At that juncture, MPC "C" is routed around the south side of Welland parallel to Townline Road where it connects to the QEW. MPC "D2" is routed around the north side of Welland and north of Port Robinson and connects to the QEW in the Lyons Creek Road area. These alternatives both

have very similar transportation performance characteristics and provide the necessary relief to the analysis area freeways. They also carry long distance traffic and international truck traffic diverted from the QEW.

- Strategic improvement to the QEW was carried forward as an alternative due to its continuing strategic role in the provincial road network and the recognition that local traffic issues in St. Catharines and Hamilton may require QEW improvements in the longer term.

C.2.2 Assessment and Evaluation of Short List of Roadway Alternatives

Three basic alternatives extracted from the "long list" were identified as warranting further detailed assessment:

- Strategic improvements to the QEW;
- Mid-Peninsula Corridor (MPC) Alternative "C"; and
- Mid-Peninsula Corridor (MPC) Alternative "D2".

The three alternatives were subjected to a detailed assessment and evaluation using the following criteria groups and sub-factors:

- Transportation
  - Provincial and Municipal Network Performance
  - Capacity
- Economic Development
  - Supports Trade and Tourism
  - Supports Existing Development and Growth Plans
  - Accessibility
- Environmental Feasibility
  - Ground and Surface Water
  - Agricultural Land
  - Wetlands, ANSI's, ESA's and Woodlands
  - National/Provincial Parks and Conservation Authority Lands
  - Unique Spaces (i.e. Niagara Escarpment)
  - Community Features
  - Air Quality
- Infrastructure Implementation
  - Cost

While it is acknowledged that this study is examining potential new routes on a "corridor basis", the assessment and evaluation of the MPC and QEW widening alternatives required an understanding of route location type issues relating to each facility.

Mid-Peninsula Corridors "C" and "D2":

- Both MPC corridors are common from the west where they connect to Highway 407 in the vicinity of Walkers Line in the City of Burlington. From there the corridor around the west side of Hamilton crosses Highway 403 in the vicinity

of Highway 6-New. The corridor then follows the top of the Niagara Escarpment to the west side of Welland adjacent to hydro/rail corridors where feasible, while minimizing impacts to the natural and built environment. At this location, the MPC "C" and "D" corridors diverge. MPC "C" crosses the Welland Canal to the south of the urban area of Welland, parallel to Niagara Regional Road 25/Netherby Road and south of the railway corridor. The corridor then proceeds easterly to intersect the QEW between Niagara Falls and Fort Erie in the vicinity of Netherby Road. MPC "D" swings north-easterly through the narrow undeveloped gap between Fonthill and Welland, crossing the Welland Canal north of Port Robinson then swings south-east to cross the Welland River and connect to the QEW in the vicinity of Lyons Creek Road. The total length of the MPC "C" corridor is approximately 131 km, while MPC "D2" is about 126 km.

- Four-lane rural freeway with a 30m median and a 100m wide right-of-way.
- The Welland Canal bridge crossing has four lanes and full shoulders with 3% grades.
- Partial interchanges only are proposed at the QEW (moves to/from Toronto-Fort Erie) and Highway 407 (moves to/from Toronto-Fort Erie). A full freeway to freeway interchange is proposed at Highway 403.
- Thirteen arterial-type interchanges are provided with Kings Highways and major municipal roads with an average spacing of 10 km.
- Sixty-three grade separation structures have been identified, (53 roadway and 10 railway crossings). The cost estimate includes detouring of cross roads.
- The two major water crossings are the Welland River and Welland Canal. A cost for drainage/stormwater management is included for creek crossings and other drainage elements.
- No major utility relocations have been assumed. Minor utility relocations are accounted for in the "minor items" cost multiplier.
- Property acquisition costs are estimated at an average of $25,000 per hectare.
- Partial illumination has been assumed (at interchanges only – e.g. no mainline illumination).
- Fully electronic tolling technology has been assumed (as per Highway 407)
- A cost per kilometre of $2,000,000 has been assumed for mainline grading and paving.

MPC - $1.2 billion

The total estimated cost for the facility is **$1.2 billion**.

QEW Corridor

- The existing QEW corridor between the Freeman interchange (Highway 403/407) and the Peace Bridge in Fort Erie is approximately 100 km in length. It follows the south shore of Lake Ontario from Hamilton to east of St. Catharines where it turns south, roughly paralleling the Niagara River until it terminates at the Peace Bridge Plaza.

- Generally, costing includes widening by one lane in each direction, following completion of currently programmed expansion from Highway 406 to Niagara Falls. A cost per kilometre of $1,000,000 (rural) and $2,000,000 (urban) has been assumed for mainline paving and grading. The higher cost of the urban section includes removal and replacement of roadside barriers, noise walls, retaining walls and adjustments to adjacent roadways where required.

- The section of the QEW between Highway 20 and Highway 406 currently has an 8-lane road base. The cost of widening this section is estimated at $192,000 per kilometre for paving, shouldering and minor grading.

- Ten lanes are proposed for the Garden City Skyway and the Burlington Bay Skyway to provide for truck climbing lanes on the long 3% grades. Provision has been made for 6 lanes during construction at each location.

- At the Garden City Skyway, a 5-lane second structure is proposed along with the redecking of the existing structure to provide a 10-lane cross-section.

- The widening of the Niagara-bound structure across Burlington Bay will accommodate three lanes in each direction during the demolition and replacement of the Toronto-bound structure and five lanes with full shoulders (one direction) when construction is complete.

- Widening at seven major water crossings is included, in addition to the Skyways (Black Creek, Twelve Mile Creek, Fifteen Mile Creek, Sixteen Mile Creek). The Henley Bridges over Twelve Mile Creek are heritage structures which must be considered during design.

- Five structures at rail lines must be widened or replaced to suit a wider QEW.

- Seven structures at road grade separations must be widened or replaced.

- Of the 30 full and partial interchanges along the corridor, structures at 17 of them will require modification or replacement.

- These interchanges include freeway to freeway interchanges (full or partial) at Highway 403/407, Highway 406, Highway 405 and Highway 420.

- Property costs have been estimated as a percentage of the basic freeway widening cost, except for the section through the City of St. Catharines where previous work has identified substantial property requirements during 8-laning.

- In rural areas, partial illumination at interchanges has been included; in urban areas, full illumination has been included.

- Drainage, stormwater management, and utility relocations have been estimated as a percentage of the basic freeway widening cost.

A detailed breakdown of the cost estimate for the widening of the QEW is provided in the attached spreadsheet. It is separated into nine sections.

QEW widening - $700 million

The total estimated cost for the widening of the QEW to 8 lanes from Highway 403/407 to the Highway 420 is **$700 million**.

Tables 3-6 provide a summary of the evaluation of the alternatives for the transportation, economic, environmental and infrastructure implementation categories.

Table 3: Evaluation of the Short List of Road Network Alternatives – Transportation Criteria

Criteria / Sub Factors	QEW (8 Lanes)	MPC "C"	MPC "D2"
Network Performance	◔	●	●
Link Performance	◔	◕	◕
Use of Existing Infrastructure	◕	○	○
System Connectivity	◔	●	●
Summary: Transportation Criteria	3	1	1

Legend:

○ *Worst*

● *Best*

The following aspects of the assessment are noted:

MPC - best network performance

- The MPC alternatives provide better overall network performance and address the corridor deficiencies.

- The MPC alternatives, provide some relief to critical link deficiencies but do not fully address specific link deficiencies on Highway 403 in Hamilton and the QEW in St. Catharines.

- QEW improvements alone, do not address the future corridor deficiency and specific link deficiencies in Hamilton.

- In the longer term, strategic QEW improvements will likely be required to address link (area) deficiencies on the QEW.

Table 4: Evaluation of the Short List of Road Network Alternatives – Economic Criteria

Criteria / Sub Factors	QEW (8 Lanes)	MPC "C"	MPC "D2"
Supports Trade			
Supports Tourism			
Supports existing development and growth strategies			
Accessibility			
Ranking	**3**	**2**	**1**

Legend:

Worst

Best

MPC - greatest level of support for trade

A Mid-Peninsula Corridor would provide the greatest level of support for trade, tourism, development growth and accessibility policies. MPC "C" is preferred to "D2" as it better promotes the Region of Niagara "growth south" planning policy, and diverts a greater proportion of long distance truck traffic from the QEW.

The next step is to compare the environmental feasibility of the three short-listed alternatives. The constraint mapping was used to identify potential low constraint corridors for the two Mid-Peninsula Corridor options. These corridors, as well as QEW widening to 8 lanes, were then assessed on the basis of a number of environmental factors. **Table 5** provides the results.

This environmental feasibility addresses the degree to which alternatives were constrained by environmental features - not specific environmental impacts. Environmental impacts can only be examined at the route locations level in a detailed environmental assessment study.

The analysis area was examined to assess the overall environmental feasibility of locating a new transportation corridor from the QEW between Niagara Falls and Fort Erie to the existing freeway network in the Hamilton area. This assessment focused on identifying "critical flaws" in terms of unacceptable impacts associated with a new corridor.

Table 5: Evaluation of the Short List of Road Network Alternatives – Environmental Criteria

Criteria / Sub Factors	QEW (8 Lanes)	MPC "C"	MPC "D2"
Groundwater			
Surface Water			
Agricultural Lands			
Wetlands			
National, Provincial and Conservation Authority Parks			
Unique Spaces - Niagara Escarpment			
Community Features			
ANSI's			
ESA's			
Woodlands			
Air Quality			
Ranking	**1**	**2**	**3**

Legend:

Worst

Best

Low constraint corridor available between Highway 403 and the QEW in Niagara

A review of the constraint mapping indicated that relatively low constraint corridors were potentially available between Highway 403 south of Hamilton and an area just west of the City of Welland. These corridors could pass on either side of Twenty Mile Creek potentially using parts of two existing utility corridors. However, a possible route around the west side of Hamilton between Highway 403 and Highway 407 appeared to be highly constrained. Similarly, a potential crossing of the Welland Canal appeared highly constrained. These two special analysis areas were reviewed in more detail using ground level and aerial reconnaissance and aerial photography.

No critical flaws

In general terms, the assessment revealed no critical flaws in establishing a new corridor through the analysis area. A new Mid-Peninsula Corridor can likely be located to minimize impacts because of the large separations between natural features and the fact that they are predominantly oriented in an east-west direction. However, the route around Hamilton has the potential to adversely affect some wetlands and environmentally sensitive areas; although it is possible to locate a route that minimizes these impacts.

The evaluation process resulted in the following findings:

- Widening of the QEW from 6 to 8 lanes will have significant community impacts in the City of St. Catharines, requiring more than 100 homes.

- Although most areas of the QEW have been planned to accommodate 8 lanes, widening of the Burlington Bay Skyway (or potentially a new structure) poses challenges given the narrow corridor and adjacent beach strip development. Suspected contaminated soils at this site will require special consideration and treatment. Widening of the QEW through the Freeman Interchange will also be difficult especially for the maintenance of traffic during construction;

- A significant potential concern associated with a widening of the QEW could be the possible effects (direct and indirect) on the tender fruitlands to the north of the escarpment due to increased development pressures. Increased development pressures may be experienced if the QEW remains the only freeway facility that traverses the Niagara Peninsula area. In addition, there would be significant impact to homes in St. Catharines with a widening of the QEW.

MPC - could minimize impacts to natural features

- The Mid-Peninsula Corridor between Niagara and Hamilton can likely be located to minimize impacts to natural features because of the large separations between these features and the fact that they are predominantly oriented in an east-west direction. However, the route around Hamilton has the potential to adversely affect some wetlands and environmentally sensitive areas; although it may be possible to locate a route that minimizes these impacts. The MPC will also have a high impact to agricultural lands. MPC "C" is preferred to MPC "D2" from a community impact perspective as "D" passes close to Fonthill and the populated area of north Welland.

Table 6: Evaluation of the Short List of Road Network Alternatives – Infrastructure Implementation Criteria

Criteria / Sub Factors	QEW	MPC "C"	MPC "D2"
Capital Cost			
Partnership Potential			
Ease of Implementation			
Ranking	3	1	2

Legend:

Worst

Best

Table 7 shows a summary of the "short list" evaluation.

The capital cost (year 2001 dollars) associated with widening the QEW is estimated to be $700,000,000. Constructing a Mid-Peninsula Corridor "C" would cost approximately $1,200,000,000 (year 2001 dollars). A similar cost is estimated for MPC "D2".

While the QEW is the least costly alternative, there is limited or no partnership potential for cost sharing and improvement would be difficult to stage while maintaining adequate traffic service.

Table 7: Summary of Short List Evaluation

Criteria	QEW	MPC "C"	MPC "D2"
Transportation	3	1	1
Economic	3	2	1
Environmental	1	2	3
Infrastructure	3	1	2
OVERALL RANK	**3**	**1**	**2**

C.3 SELECTION OF PREFERRED ROADWAY ALTERNATIVE(S) AND STAGING OPTIONS

A Mid-Peninsula Corridor will defer but not negate the need for future strategic improvements to the QEW.

The results of the evaluation process indicate that, ultimately (beyond 2011), a Mid-Peninsula Corridor provides the best potential for improvement to the overall road network and meeting the transportation system goals. A Mid-Peninsula Corridor provides a high level of support to trade, tourism, growth and accessibility goals. It also provides relief to the overall road network by reducing the amount of congestion and increasing average vehicle speeds. Using the evaluation process and criteria summarized in this document, MPC Alternative "C" has been identified as the preferred corridor.

The assessment also indicates that strategic improvements to the QEW corridor will be necessary in the long term.

D. FINANCIAL FEASIBILITY ASSESSMENT

D.1 FINANCIAL ASSESSMENT

Although not included as part of the evaluation framework, a feasibility level financial analysis was conducted of all the MPC alternatives. This analysis was conducted to:

- Assess the financial viability of tolling the proposed Mid-Peninsula facility.
- Assess the network implication of the tolling strategies applied to the Mid-Peninsula Corridor (MPC).
- Quantify the capital costs, operating costs, operating revenues and an investment rate of return; and Identify possible risks and funding gaps.

The financial analysis builds on the demand forecasting work completed under the demand analysis component of the Needs Assessment. Using the characteristics from the existing QEW (east-west travel in the Niagara Peninsula corridor) and Highway 407 (existing toll facility) relationships were built for the MPC:

- p.m. peak hour to daily and daily to annual factors.
- Peak period and off peak period toll rates.

The MTO model was used to determine the p.m. peak hour volumes and travel distances, as well as the commercial vehicle usage of the facility. This approach is consistent with the past MTO studies for Highway 407 and other toll feasibility studies currently being undertaken by the Ministry. The key inputs to the analysis were:

- Travel demand/volume forecasts.
- Costs – Capital and Operating.
- Economic variables – Inflation rate, user values of time, investment horizon, "ramp up" use.
- Tolling variables – toll rates, service charges, transponder use.
- Staging of infrastructure.

It is important to note that this is not an investment grade financial study but a financial feasibility assessment. An investment grade study would require a more rigorous exploration of all of the key inputs as well as the exploration of the financial analysis of all of the road and planning alternatives.

MPC - IRR of 3.5%

Based upon MPC Alternative "C", the analysis determined that the entire MPC (QEW Niagara to Highway 407) could have a projected internal rate of return (IRR) in the order of 3.5%. As a result of this low IRR for the entire Mid-Peninsula Corridor, a staged approach was considered. The section of the Mid-Peninsula Corridor from Highway 407 to Highway 403/Highway 6 was found to have a higher IRR (approximately 6%) because of the higher demand/use and the lower initial capital cost.

Additional sensitivity testing was performed for each of the key inputs to the rate of return calculations. Variations in the key inputs had the following effects on the rate of return:

Capital Cost – a 25% reduction in the capital cost of the facility would result in an increase in the rate of return from less than 3.5% to 6.0%. A reduction of 50% would result in a rate of return of 9%.

Maintenance Cost - a 50% reduction in the annual maintenance costs for the facility would result in an increase in the rate of return by approximately 1%.

Commercial Vehicle Use – a 25% increase in truck use on the Niagara section of the MPC would result in an increase in the rate of return by approximately 1%.

Capital cost - major effect on IRR

It is clear that the input that has the most pronounced effect on the rate of return is the initial capital cost of the facility. Whether a reduction in the capital cost is achieved through a Value Engineering exercise to reduce the construction costs or by the contribution of additional funds from other sources, it estimated that to achieve a rate of return of 10%, more than 50% of the capital cost would have to be injected into the project.

Public sector investment required

Although opportunities still exist for private sector involvement/investment in the MPC, it is clear from the IRR's identified as a result of the feasibility level financial analysis that public sector investment in the project will be required. Given the overall rationale and justification behind the recommendation to implement the MPC, it is suggested that there are both provincial and municipal interests in this project that should be considered in the context of any public sector contribution to this facility.

E. IDENTIFICATION OF POTENTIAL IMPLEMENTATION STRATEGIES

E.1 TRANSPORTATION DEVELOPMENT STRATEGY

Achieving Smart Growth

The Niagara Peninsula Transportation Needs Assessment produced a Transportation Development Strategy that provides a safe, efficient, effective and reliable transportation system and also facilitates economic growth at both a provincial and regional/municipal level, while respecting critical environmental concerns. The plan is consistent with the three basic guiding principles or pillars for "Smart Growth" in Ontario as identified by the Provincial Governments:

- Sustaining a strong economy.
- Building strong communities.
- Promoting a healthy environment.

There are fundamental elements regarding transportation in and through the Niagara Peninsula that were considered within the context of developing the Transportation Development Strategy:

- The efficient and reliable movement of commercial vehicles through the Niagara Peninsula area linking southern Ontario and the GTA to the international border crossings is vital to economic growth in the Region of Niagara, the City of Hamilton and the Province.

- The promotion of public transportation in the form of bus, rail and ferry services, provides transportation choice and the means to reduce automobile use; however, these modes can not address the diverse user needs nor significantly alleviate QEW traffic congestion.

- There are opportunities for improved transit and rail service to carry tourists/visitors between the GTA and the Region of Niagara.

- Rail currently plays a significant role in the movement of goods through the Peninsula and will continue to do so. However, it unlikely that this share will increase due to the nature of the commodities transported and the trend towards greater use of "just-in-time" strategies.

The Transportation Development Strategy includes the following elements and is summarized in the attached **Tables 8** through **10**.

- Roadways;
- Transportation Systems Management;
- Passenger Rail Service;
- Travel Demand Management and Transit; and
- Ferry Service.

Exhibit 30 shows the recommended roadway improvements. **Exhibit 31** shows the recommended Transit, TDM and TSM Studies.

E.1.1 Roadways

Mid-Peninsula Highway - centrepiece of the strategy

The centrepiece of the Transportation Development Strategy is a new Mid-Peninsula Corridor (MPC) running from the QEW between Niagara Falls and Fort Erie, westward to south of Hamilton International Airport, and then around Hamilton and connecting to Highway 407 in Halton Region.

It has been concluded that a new Mid-Peninsula Corridor incorporating a highway (MPH) will be required along with strategic upgrading of the QEW to accommodate travel demand and to facilitate reliable goods movement, within, and through the analysis area. It is recommended that the MPH be constructed first and that strategic improvements to the QEW be made over the longer term. It is recommended that an Environmental Assessment Terms of Reference be initiated to facilitate protection of an MPH route. The MPH represents the platform around which other strategies have been formulated.

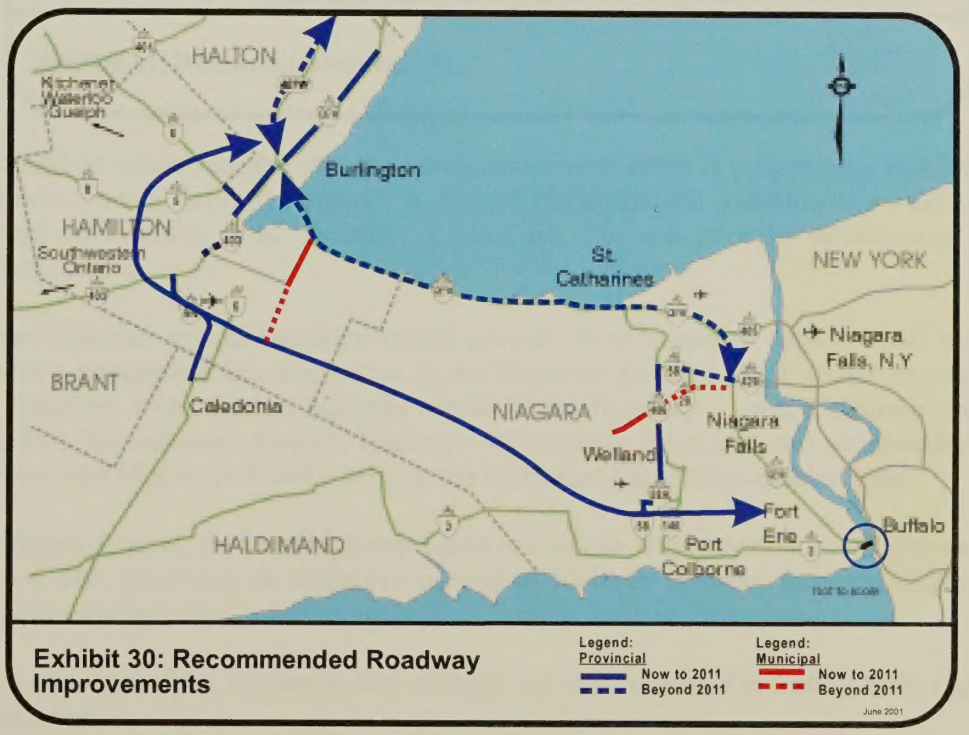


Exhibit 30: Recommended Roadway Improvements

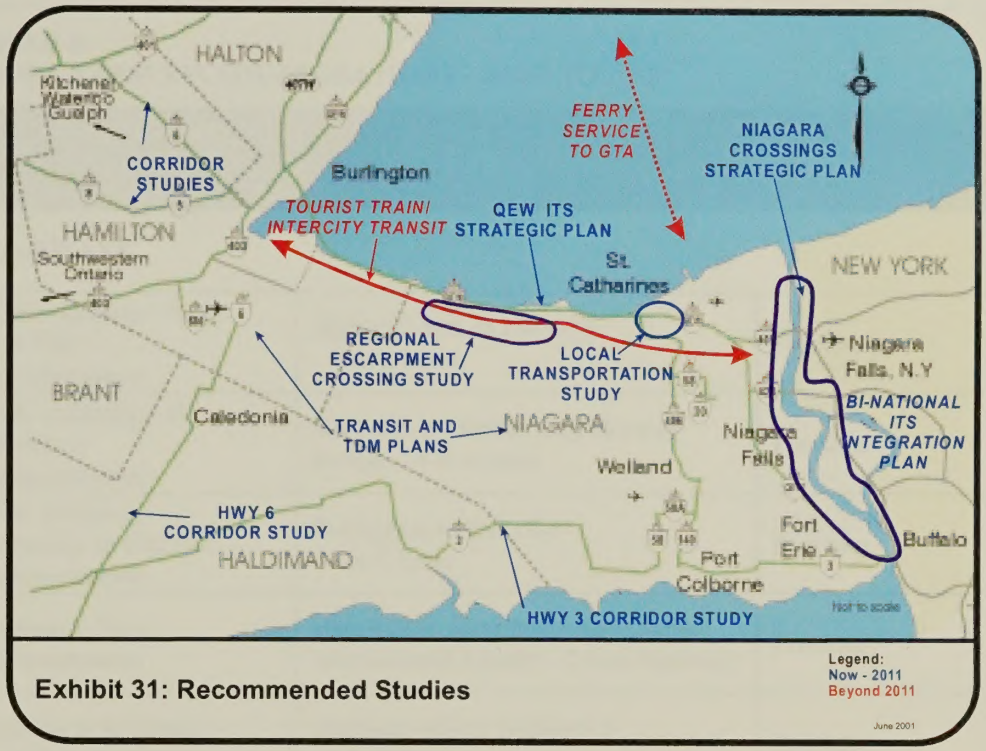


Exhibit 31: Recommended Studies

It should be acknowledged that the needs assessment study is proposing a possible corridor – not a definitive route. A formal environmental assessment would be utilized to examine route location options and impacts prior to determining a preferred route.

A new highway around Hamilton would provide direct access to Highway 407 and present a congestion free alternative to the Highway 403 and QEW routes through the Hamilton area. Such a highway would "link" Highway 6, near Caledonia and Hamilton International Airport, Highway 403 serving Brantford and southwestern Ontario, and Highways 8 and 6 serving the Kitchener-Cambridge-Guelph area.

In Niagara Region, the new highway could connect to Highway 406 and Highways 58 and 140, providing an extensive provincial highway network through Niagara Region's southern tier.

Other elements of the suggested road strategy are also contained in **Tables 8** through **10** attached.

TABLE 8:
SHORT TERM RECOMMENDATIONS – NOW TO 2005

Transportation Improvement Initiative	Project Description	Proponency
ROADWAYS		
QEW widening – Sand Plant Hill Implementation	Highway 405. to Hwy420 – 4 to 6 lanes	Province
QEW widening - St. Catharines Implementation	Hwy 406 to Garden City Skyway Bridge – 4 to 6 lanes	Province
QEW widening – Burlington to Oakville Implementation	Burlington to Oakville - 6 to 8 lanes	Province
Highway 6 New - Implementation	Hwy 403 to Hamilton International International Airport – 2 lane highway	Province
Highway 6 Widening - Implementation	Highway 403 to Highway 5 - 4 to 6 lanes	Province
Highway 406 Widening – Implementation	Beaverdams Rd. to Port Robinson (Thorold) – 2 lanes to 4 lane Controlled Access Highway	Province
Mid-Peninsula Highway – Initiate EA Study	Niagara (QEW) to Halton (Hwy 407) 4 lane highway	Province
Highway 420 Extension – Initiate EA Study	Hwy 420 (Niagara Falls) to Hwy 58 (Thorold Tunnel) 4- lane Controlled Access Highway	Province
Highway 3 Corridor – Study	Fort Erie to St. Thomas	Province
Red Hill Creek Expressway Implementation*	Lincoln Alexander Parkway to QEW - 5 lanes	Hamilton
Improved Arterial Connection from Niagara Falls to Hwy 406 - Municipal Needs Study	Link Connecting Niagara Falls to Welland/Pelham area	Niagara
St. Catharines Improved Arterial Roads - Municipal Needs Study	Improvement to municipal roads to alleviate QEW traffic problems	St. Catharines
Niagara Regional Escarpment Crossing Study	Assessment of Regional Escarpment crossing requirements	Niagara

TABLE 8:
SHORT TERM RECOMMENDATIONS – NOW TO 2005

Transportation Improvement Initiative	Project Description	Proponency
TRANSPORTATION SYSTEMS MANAGEMENT		
Niagara Crossings – Develop Strategic Plan	Four Niagara Bridges and roadway access	T.B.D.
TRAVEL DEMAND MANAGEMENT AND TRANSIT		
Region of Niagara – Transit/TDM Study	Assessment of transit and travel demand management opportunities	Niagara
City of Hamilton - Transit/TDM Study	Assessment of transit and travel demand management opportunities	Hamilton
PASSENGER RAIL SERVICE		
Regional Rail Service - Rail Feasibility Study	Tourism (Weekend/ Seasonal) Niagara Region to GTA	T.B.D.
FERRY SERVICE		
Ferry Service – Opportunities Study	Niagara Region to GTA	Private Sector

TABLE 9:
MEDIUM TERM RECOMMENDATIONS – 2006 TO 2011

Transportation Improvement Initiative	Project Description	Proponency
ROADWAYS		
Mid-Peninsula Corridor – Staged Implementation	QEW in Niagara to Hwy 407 in Halton - 4 lane highway	Province/Private Sector
Highway 403 Widening – Implementation	QEW to Main St. (Hamilton) - 6 to 8 lanes	Province
QEW Widening - Freeman Interchange Implementation	Burlington Bay Skyway to Freeman Interchange - 6 to 8 lanes	Province
Highway 6 New – Implementation*	Hamilton International Airport to Caledonia	Province
Highway 406 Widening – Implementation	Port Robinson (Thorold) to East Main St. (Welland) – 2 lanes to 4 lane Controlled Access Hwy	Province
Highway 406 Extension – Implementation*	East Main St. (Welland) to Hwy 58 or Mid-Peninsula Hwy – 2 lane Controlled Access Major Arterial	Province
Highway 6 Improvements – Corridor Needs Study	Caledonia to Lake Erie Operational / Local bypasses	Province
Highway 6 or Highway 8 and 24 Improvements - Corridor Needs Study*	Highway 5 to Highway 401	Province
Improved Regional Road 20 Implementation	Link Connecting Pelham to Hwy 406	Niagara
Hamilton North/South Links Municipal Needs Study*	Link connecting the Mid-Peninsula Highway to Red Hill Creek Expy.	Hamilton
*** Need / Function dependent of Mid-Peninsula Highway Route Location**		
TRANSPORTATION SYSTEMS MANAGEMENT		
QEW ITS – Develop Strategic Plan	Hamilton to Fort Erie including Highways 405, 406 and 420	Province
Bi-National ITS integration - Roadways and Bridges Develop Strategic Plan	QEW, Mid-Peninsula Highway, Municipal roads, U.S. roads, Niagara Bridges	T.B.D.

TABLE 9:
MEDIUM TERM RECOMMENDATIONS – 2006 TO 2011

Transportation Improvement Initiative	Project Description	Proponency
TRAVEL DEMAND MANAGEMENT AND TRANSIT		
Region of Niagara - TDM and Transit Strategy Implementation	TDM and Transit Strategies to support planning objectives	Niagara
City of Hamilton – TDM and Transit Strategy Implementation	TDM and Transit Strategies to support planning objectives	Hamilton
PASSENGER RAIL SERVICE		
Regional Rail Service - Implementation	Tourism (Weekend/ Seasonal) Niagara Region to GTA	T.B.D.
Commuter Rail Service - Rail Feasibility Study	Niagara Region to GTA	T.B.D.
FERRY SERVICE		
Ferry Service – Implementation	Niagara Region to GTA	Private Sector

TABLE 10:
LONG TERM RECOMMENDATIONS – BEYOND 2011

Transportation Improvement Initiative	Project Description	Proponency
ROADWAYS		
QEW Strategic Upgrading – Staged Implementation*	Niagara Falls to Hamilton	Province
Highway 403 widening Implementation*	Main St. Hamilton to Lincoln Alexander Parkway	Province
Highway 407 Widening Implementation	Halton Region	Private Sector

TABLE 10:
LONG TERM RECOMMENDATIONS – BEYOND 2011

Transportation Improvement Initiative	Project Description	Proponency
Hwy. 420 Extension - Implementation	Hwy. 420 (Niagara Falls) to Hwy. 58 (Thorold Tunnel) - 4 lane C.A.H.	Province
Improved Arterial Connection from Niagara Falls to Hwy 406 – Implementation	Link Connecting Niagara Falls to Welland/Pelham area	Niagara
Hamilton North/South Link – Implementation*	Link Connecting Mid-Peninsula Highway to Red Hill Creek Expressway	Hamilton
PASSENGER RAIL SERVICE		
Commuter Rail Service - Implementation	Niagara Region to GTA	T.B.D.
TRANSPORTATION SYSTEMS MANAGEMENT		
QEW ITS – Implementation	Hamilton to Fort Erie including Highways 405, 406 and 420	Province
Bi-National ITS integration - Roadways and Bridges	QEW, Mid-Peninsula Hwy Municipal roads, U.S. roads, Niagara Bridges	T.B.D.

*** Need / Function dependent of Mid-Peninsula Highway Route Location**

E.1.2 Passenger Rail, Transit and Ferry Services

Passenger rail, transit and ferry services

It is recommended that, in the Region of Niagara and the City of Hamilton, studies be undertaken to assess potential for upgrading local, inter-municipal and rural transit services using traditional and innovative strategies. This may include the examination of the need for regional transit service in Niagara. Inter-regional linkages should be considered in the context of these studies.

With respect to upgrading transit service to serve visitors and/or commuters between the analysis area and the GTA in particular, it is suggested that the Province's municipal partners initiate discussions with GO Transit and VIA Rail with the objective of further investigating the feasibility of rail service to Niagara Region, and in particular, Niagara Falls. The study has identified limited opportunities for commuter type rail service to the Niagara Region. However, it has confirmed that significant opportunities exist to provide rail or other inter-city transit services for visitors travelling between the GTA and Niagara Falls.

The study also acknowledged that there is an existing ferry service between Queenston and Toronto, providing service for visitors on weekends. Analysis has revealed a limited market for ferry services and that marine operations have limited potential to remove traffic from the highways in the Niagara Peninsula.

E.1.3 Improving Roadway Efficiency (Transportation Systems Management and Travel Demand Management)

TSM and TDM

In conjunction with expansion of the road network, a number of strategies are available to facilitate more efficient use of the roadway system by increasing system speed and capacity without requiring physical expansion. In addition, there are opportunities to implement intelligent transportation systems (ITS) as technologies continue to evolve and develop.

Other emerging trends that are becoming more accepted by the public should also be considered. These include issues relating to transportation demand management. Drivers are adapting their travel patterns to deal with traffic congestion. People will continue to choose their residential and employment locations in ways that minimize inconvenience. Internet commerce and telecommuting are increasing their market shares and these initiatives are likely to reduce peak period demands for shopping and employment-type travel.

It is suggested that both the Region of Niagara and the City of Hamilton undertake transit/transportation demand management (TDM) studies to identify opportunities to reduce auto use through the implementation of strategic policies, incentives and demand management programs.

E.1.4 Rationale for the Proposed Transportation Development Strategy

MPC - Provincial and Municipal benefits

The proposed Transportation Development Strategy addresses both provincial and municipal policies and issues.

E.1.4.1 Provincial Significance

The proposed development strategy achieves the following benefits:

- Enhances the ability of the existing trade corridor to accommodate growth in goods movement and tourism.
- Provides benefits to the provincial highway network in the Hamilton area including the QEW and Highway 403, by providing a congestion-free alternative.
- Permits the ability to defer any QEW widening beyond the existing six lanes and planned expansion through St. Catharines.
- Provides a viable, high capacity alternative to the QEW for autos and commercial vehicles.
- Permits more efficient rehabilitation/improvement of various elements of the QEW including the Garden City Skyway.
- Provides a viable alternate route in case of QEW closure due to an accident, spill or local weather-related issues.

- Facilitates improved linkages between the Niagara border crossings and Southwestern Ontario, including Kitchener/Waterloo, Guelph, London, etc. for vehicles and commercial goods movement.
- Provides additional road network capacity to deal with potentially significant increases in visitation/tourism to the Peninsula.

E.1.4.2 Municipal Significance

The proposed Transportation Development Strategy achieves the following benefits:

- Combined with other local/regional legislative initiatives, the development strategy may assist in facilitating protection of tender fruitlands along the QEW corridor.
- There will be substantive benefit to the local and provincial roadway network in the Hamilton area.

The provision of an MPC will enhance freeway level accessibility to: Welland, Port Colborne, St. Catharines, Niagara Falls, Fort Erie, Haldimand and Hamilton International Airport.

E.1.4.3 Moving Forward - The Environmental Assessment Process and the Mid-Peninsula Highway

Move forward with an Environmental Assessment

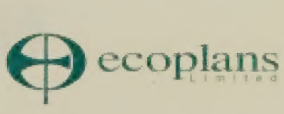
The MPH has been identified as the key element in the Transportation Development Strategy. A number of other elements within the strategy hinge on MPH implementation. As a result, it is recommended that MTO initiate the environmental assessment process for a Mid-Peninsula Highway. This will involve the preparation of the Environmental Assessment Terms of Reference and finalization of the Needs Assessment report, followed by the initiation of a route location and concept design environmental assessment for the Mid-Peninsula Highway.

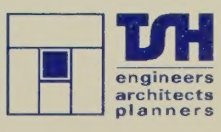
With respect to the MPH, in the east the analysis area for an EA should permit consideration of both MPC Alternatives "C" and "D2" as presented in this document. West of Welland to Highway 407, the alignments for MPC Alternatives "C" and "D2" are the same and a study area could be established accordingly. The proposed Mid-Peninsula Highway Study Area is depicted on **Exhibit 32**. This Study Area encompasses many possible route locations that can only be determined and assessed through detailed environmental assessment involving full public consultation.

Exhibit 32:
Proposed Environmental Assessment Study Area: Mid-Peninsula Highway

Niagara Peninsula Transportation Needs Assessment Study

Environmental Report





Niagara Peninsula Transportation Needs Assessment Study

Environmental Report

McCormick Rankin Corporation

July 11, 2001

1.0 INTRODUCTION 1
2.0 INITIAL NEEDS ASSESSMENT ANALYSIS AREA 1
3.0 ENVIRONMENTAL CONSTRAINTS, OPPORTUNITIES AND RATIONALE 3
4.0 CONSTRAINT MAP 6
5.0 REFINE NEEDS ASSESSMENT ANALYSIS AREA 7
6.0 DESCRIPTION OF THE ANALYSIS AREA 7
6.1 Preamble 7
6.2 Groundwater 8
6.3 Surface Water 8
6.4 Agricultural Lands 9
6.5 Environmentally Significant or Sensitive Features 10
6.5.1 Provincially Significant Wetlands (PSWs) 10
6.5.2 Areas of Natural and Scientific Interest (ANSIs) 12
6.5.3 Environmentally Sensitive Areas (*ESA*s) 13
6.6 Woodlands 13
6.7 Carolinian Canada Sites 14
6.8 Parks and Conservation Authority Lands 15
6.9 Unique Features 15
6.9.1 The Niagara Escarpment 16
6.9.2 Wainfleet Marsh and Bog 16
6.9.3 Welland Canal 16
6.9.4 Quarries 17
6.10 Community Features 17
7.0 ASSESS ROADWAY ALTERNATIVES 17
7.1 Introduction 17
7.2 Description of the Alternatives 18
7.2.1 QEW Widening to 8 Lanes 18
7.2.2 Mid-Peninsula Corridor 18
7.2.3 Environmental Evaluation 20
8.0 CONCLUSION 23

1.0 INTRODUCTION

The Ministry of Transportation of Ontario in consultation with the Regional Municipality of Niagara and the City of Hamilton (former Region of Hamilton-Wentworth) initiated a Needs Assessment Study for the Niagara area to determine if the existing transportation network is sufficient to meet transportation demands into the future. Environmental considerations are integral to the development and analysis of transportation options.

The purpose of the environmental work stream is:

1. To identify and map the critical environmental features in the Needs Assessment Analysis Area to help in the identification of potential low-constraint corridors;

2. To screen roadway alternatives that meet the economic and transportation goals in order to identify and assess environmental constraints; and

3. To determine the environmental feasibility of the identified roadway alternatives.

The environmental feasibility component of the study followed a 7 step process as presented in Table 1. Alternatives that did not meet the economic and transportation objectives were removed from the environmental feasibility analysis, and the remaining alternatives were evaluated. This report is organized around these steps.

Table 1
Environmental Feasibility – Evaluation Framework
Process Step

1. Establish Needs Assessment Analysis Area
2. Identify Environmental Constraints, Opportunities & Rationale
3. Prepare Constraint Map
4. Refine Analysis Area
5. Describe Analysis Area
6. Assess Roadway Alternatives
7. Prepare Environmental Report

2.0 INITIAL NEEDS ASSESSMENT ANALYSIS AREA

The Niagara Peninsula provides an important transportation link between the USA and Ontario. Currently the QEW is the only east-west expressway that serves road travel demands in this area. It was important to select an Analysis Area that was large enough to assess the transportation demands and possible solutions. The Analysis Area (see Figure 1) had to allow the consideration of new corridor possibilities to the south of the Niagara Escarpment and around the south end of Hamilton. The initial Analysis Area selected includes the new City of Hamilton, the Regional Municipality of Niagara and part of the City of Burlington in the Regional Municipality of Halton. The western portion of the Regional Municipality of Halton was included because of the importance of being able to move traffic to, and through Hamilton to the Greater Toronto Area and beyond.

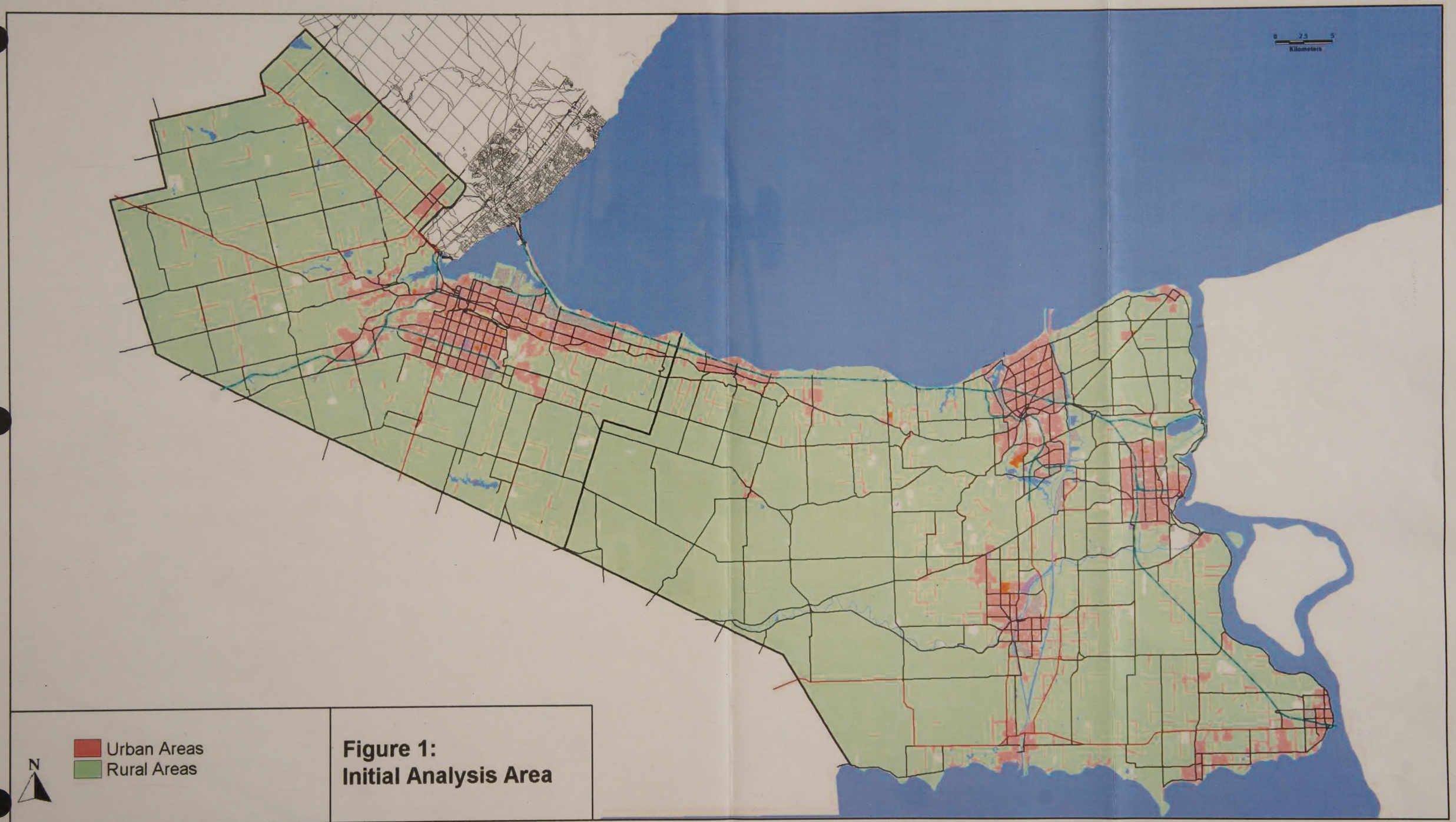


Figure 1:
Initial Analysis Area

3.0 ENVIRONMENTAL CONSTRAINTS, OPPORTUNITIES AND RATIONALE

The intent of the environmental review was to gain an understanding of the environmental conditions of the Analysis Area allowing for the identification of low constraint corridors. In this way, opportunities for avoiding environmental impacts are maximized.

The study team gathered environmental information on the Analysis Area using secondary sources. Both the Region of Niagara and the City of Hamilton have excellent mapping that was made available for this project. The Region of Niagara's coverage was used as the base for the study because it included the entire Analysis Area except for the Region of Halton. The information on the Region of Niagara's maps was supplemented with information from Hamilton, Halton and other secondary sources.

The environmental factors considered in this Needs Assessment Study and the rationale and interpretation for considering these factors are presented in Table 2. The selected factors were based on the Study Team's environmental planning experience in Ontario, The *Planning Act* and the *Provincial Policy Statement* issued under *Bill 20*. The *Provincial Policy Statement* provides direction on matters of provincial interest that planning authorities "shall have regard to" when exercising any authority that affects a planning matter.

Table 2

FACTOR & INDICATOR	RATIONALE & INTERPRETATION
Groundwater Quality & Quantity. • *Soils that are susceptible to infiltration and therefore contamination*	Groundwater resources are under pressure from various developments. *The Provincial Policy Statement* has the objective of protecting or enhancing groundwater quality and quantity and the function of sensitive groundwater recharge/discharge areas and aquifers. Transportation facilities have the potential to impact groundwater resources through removal of recharge areas and contaminated runoffs and therefore, where possible, recharge areas should be avoided. However, since groundwater can be protected through proper design measures, avoidance is not required. For this study, Ministry of the Environment mapping of susceptibility to groundwater contamination was used. The extent to which alternatives cross zones of high susceptibility was determined. For the purposes of Needs Assessment Studies, susceptibility to contamination would not be a high constraint because of the ability to avoid and/or mitigate potential impacts. However, these areas should be considered when proposing new corridors and assessing alternatives.

Table 2

FACTOR & INDICATOR	RATIONALE & INTERPRETATION
Surface Water Quality & Quantity • *Permanent watercourses & significant valleylands*	It is very difficult to locate a transportation facility without crossing watercourses and valleylands. The *Provincial Policy Statement* has the objective of protecting or enhancing surface water quality including the function of headwaters. As well, development and site alteration is permitted in significant valleylands provided it can be demonstrated that there will be no negative impacts to the natural features or ecological functions for which the area is identified. Crossings should be minimized. Transportation facilities should not be placed along watercourses or valleylands. The alternatives should be selected to minimize the potential for impacting surface water. The number of possible watercourse crossings was identified.
Agricultural Lands • *Tender fruit lands* • *Specialty crop lands* • *Class 1,2,3 soils in areas generally lacking productive agricultural lands*	The *Provincial Policy Statement* has an objective of protecting prime agricultural areas. The policy presents a hierarchy of significance with specialty crop areas being most significant, followed by Class 1, 2 and 3 agricultural lands, in that order. • Tender fruit lands require a unique combination of soil and climate and therefore must be avoided. • Specialty crop areas may require special soil characteristics and should be avoided where possible. • The significance of Class 1,2,3 soils is related to the abundance of these soils in the assessment area. Where these soils are abundant, this indicator would not likely preclude a transportation facility. Where these soils are limited, they should be avoided. The Analysis Area is unique in Ontario because it has large areas of tender fruit lands. These lands are under development pressures. Avoidance of tender fruit lands will be a criterion in the identification of new corridors. New corridors and improvements to existing corridors will be evaluated on the basis of their potential to impact agricultural lands. When identifying corridors for new transportation facilities in the Niagara area, tender fruit lands will be considered to be a significant constraint. An additional consideration when assessing alternatives is the developmental pressures along the QEW. Since the Niagara Escarpment constrains development to the south, any additional development along the QEW could significantly impact the tender fruit lands in this area. Although general agricultural land is also important, it would be impossible to locate a new facility in the Analysis Area without impacting general agricultural lands. Therefore they are not considered to be a major constraint. The number of hectares of agricultural land potentially affected was determined.
Wetlands • *Provincially significant wetlands south and east of the Canadian Shield.*	Ontario's *Provincial Policy Statement* prohibits development and site alteration in wetlands located south and east of the Canadian Shield. For this study, Provincially significant and locally significant wetlands were identified. Avoidance of wetlands will be a criterion in the identification of any new corridors. The potential to impact wetlands will be used to evaluate alternatives. The number of hectares of wetlands potentially affected was determined.

Table 2	
FACTOR & INDICATOR	**RATIONALE & INTERPRETATION**
Areas of Natural and Scientific Interest (ANSIs)	Avoidance of ANSIs is preferred, however, the *Provincial Policy Statement* permits transportation facilities within ANSIs if it can be demonstrated that there will be no negative impacts to the natural features or ecological functions for which the area is identified. The ANSIs in the Analysis Area are mostly associated with wetlands and/or the Niagara Escarpment. Avoidance of ANSIs will be a criterion in the identification of any new corridors. The potential to impact ANSIs will be used to evaluate alternatives. The number of hectares of ANSIs potentially affected was determined.
Environmentally Sensitive Areas (ESA)	ESAs are not included in the *Provincial Policy Statement* but are often associated with other features covered by the Policy Statement, and are reflected in Conservation Authority Plans and/or municipal land use plans. Transportation facilities are permitted within ESAs if it can be demonstrated that there will be no negative impacts to the natural features or ecological functions for which the area is identified. Avoidance of ESAs will be a criterion in the identification of any new corridors. The potential to impact ESAs will be used to evaluate alternatives. The number of hectares of ESAs potentially affected was determined.
Woodlands • *Woodlands south and east of the Canadian Shield* • *Significance of a woodland area is related to the abundance within the Analysis Area.*	The *Provincial Policy Statement* permits transportation facilities within woodlands south and east of the Canadian Shield if it can be demonstrated that there will be no negative impacts to the natural features or ecological functions for which the area is identified. The percentage of coverage in the Analysis Area is approximately 14%. Therefore woodlands greater than 4 ha are considered significant. Woodlands were mapped and considered when identifying corridors and evaluating alternatives. The number of hectares of woodlands potentially affected was determined.
National, Provincial and Conservation Authority Parks	Parks are generally lands in public ownership aimed at preserving significant and often unique components of the environment, and providing recreational opportunities. It is therefore desirable to minimize any impacts to parks. National & Provincial Parks, and Conservation Areas are to be avoided to the extent possible. However, in some cases, transportation facilities can be placed within park boundaries without adversely affecting the park. The National, Provincial and Conservation Authority parks within the Analysis Area were identified. Avoidance of parks will be a criterion in the identification of any new corridors. The potential to impact parks will be used to evaluate alternatives. The number of parks potentially affected was determined.

Table 2	
FACTOR & INDICATOR	**RATIONALE & INTERPRETATION**
Unique Spaces (e.g. Niagara Escarpment) • *Indicators to be determined on a project by project basis*	The Niagara Escarpment is a prominent feature passing through the Analysis Area. It is classified as a UNESCO world Biosphere Reserve and its management is governed by the Niagara Escarpment Commission and the Niagara Escarpment Plan. The Niagara Escarpment represents a major constraint to transportation because of the ecological significance of the natural areas and the linear corridor it provides; and the steep topographical relief along much of the length of the escarpment. The *Niagara Escarpment Plan* does permit "essential transportation and utility facilities" within the Escarpment Natural Area, the Escarpment Protection Area and the Escarpment Rural Area. However, to the extent possible, Escarpment Natural and Protection Areas should be avoided. Avoidance of Escarpment Natural and Protected Areas will be a criterion in the identification of any new corridors. The potential to impact the escarpment will be used to evaluate alternatives. The number of hectares of Niagara Escarpment land potentially affected was determined.
Community Features • *Existing developed areas and planned urban expansions*	Transportation facilities that are located near existing developed areas can impact these areas through direct loss of homes and businesses, or by increased noise, dust and traffic. New transportation facilities should avoid existing urban development. New transportation facilities can be located within proposed expanded urban boundaries. Avoidance of urban areas will be a criterion in the identification of any new corridors. The potential to impact community features will be used to evaluate alternatives.

4.0 CONSTRAINT MAP

A consolidated constraint map was prepared using the data assembled from the secondary sources. This constraint map is presented as Figure 2.

The constraint map was important in identifying potential corridors for a new route referred to as the Mid-Peninsula Corridor. The intent was to minimize the potential for adverse environmental effects by selecting a corridor that avoided as many environmental features as possible while still making sense from a transportation perspective. If the transportation analysis concluded that a new route should be investigated, it is important to determine whether or not such a route is environmentally and technically feasible. The subsequent analysis was carried out to determine the extent to which environmental factors could constrain the establishment of a 100-meter right-of-way for a new highway. In most cases, a single factor would not preclude the siting of a new facility, however it is possible that a large sensitive feature, or a grouping of several small sensitive features could pose sufficient challenge to siting a new facility as to preclude any option in that area. The constraint map was also used to assess the environmental feasibility of improvements to existing facilities (i.e. QEW widening). Once the constraint map had been prepared, it became evident to the Study Team that there were two areas where more detailed investigation was required to be certain that a potential route could be found. These two areas are:

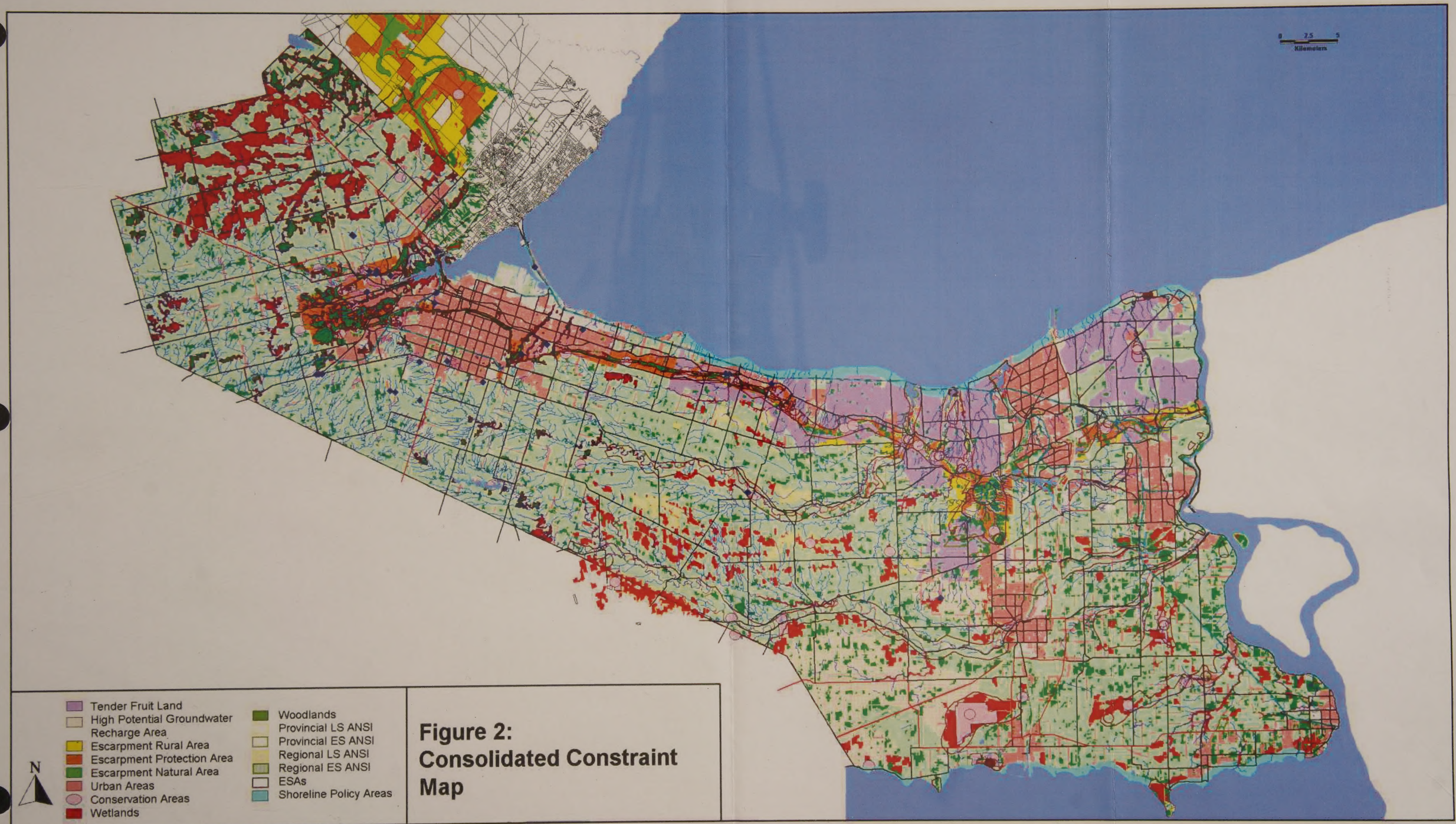


Figure 2:
Consolidated Constraint Map

1. Route Around Hamilton: - The transportation analysis determined that a new corridor may need to go around the south side of the City of Hamilton connecting Highway 403 south of Hamilton, to Highway 407 in Burlington. This area is highly constrained by the escarpment, wetlands, ESAs and urban development.

2. Welland Canal Crossing: - A viable crossing of the Welland Canal is essential to any Mid-Peninsula Corridor. The area along the Welland Canal between St. Catharines and Port Colborne is highly constrained by urban development, the escarpment, Short Hills Provincial Park, and provincially significant wetlands.

These detailed reviews are discussed later in this report.

5.0 REFINE NEEDS ASSESSMENT ANALYSIS AREA

The initial Analysis Area was reviewed in light of the ongoing transportation analysis and the environmental inventory and was determined to be sufficient for the purposes of this Need Assessment Study.

6.0 DESCRIPTION OF THE ANALYSIS AREA

6.1 Preamble

The area is primarily within the Deciduous Forest Region (Carolinian Life Zone), grading into the Great Lakes - St. Lawrence Lowlands Life Zone in northern Hamilton. The Carolinian Life Zone is a biologically diverse region that is at its most northerly extent in southern Ontario. The area is characterized by rich deciduous woods, prairies, alvars and wetlands. The flora and fauna of this region are unique to Canada and many rare habitats and species are recorded in the remaining natural areas of the Carolinian region. The Carolinian Canada zone occupies less than 1% of Canada's land mass, but 25% of Canada's population lives in the area. The area has more species of plants and birds than any other life zone in Canada. As such, even small, degraded or isolated remnant woodlots or wetlands have some ecological significance while larger natural, relatively undisturbed blocks have high ecological sensitivity and value.

There are nine major categories of cultural and environmental factors considered in the identification and evaluation of transportation options through the Analysis Area. They are:

- groundwater;
- surface water;
- agricultural lands;
- environmentally significant features;
- woodlands not included in other designations;
- Carolinian Canada sites;
- parks and conservation authority lands;
- unique features; and
- community features.

The following subsections describe the Analysis Area with respect to each of these factors.

6.2 Groundwater

In general, groundwater issues include: the impact to areas of potential groundwater recharge; contamination; and disruption of headwater streams or other sensitive aquatic systems.

It is an objective of the *Provincial Policy Statement* to protect or enhance the function of sensitive groundwater recharge/discharge areas, aquifers and headwaters.

i. Groundwater recharge zones are associated with well-drained soils, permeable overburden layers and shallow bedrock. They are commonly found in areas that have granular overburden material, such as kames or moraines. In the Analysis Area, these areas are concentrated along the Niagara Escarpment (Vinemount Moraine and Fonthill Kame), in scattered small pockets (Niagara Falls and Fort Erie Moraines) or larger soil zones (Dunnville Sand Plain). The potential for recharge in these areas is variable, depending on the permeability of granular subsurface materials and depth of upper clay/silt layers.

   Three major areas of potential groundwater recharge have been identified within the Analysis Area: along the Lake Ontario shoreline near St. Catharines; near Fonthill - Welland; and west of Port Colborne (Ministry of the Environment, 1981). These are illustrated on Figure 3 – Surface and Groundwater.

ii. Groundwater contamination is another key issue. The three major recharge areas mentioned above are rated as having high susceptibility to contamination. Roadway contaminants such as road salt or chemical spills could impact the underlying aquifers.

iii. A third key issue with respect to groundwater is the disruption of headwater creeks or other sensitive aquatic systems. This can occur if groundwater maintained baseflow is interrupted (e.g. by construction, altered drainage or excavation / fill of different substrates which impact groundwater flow to the creek). There are numerous creeks in the Analysis Area. These are discussed further in the next section.

6.3 Surface Water

It is an objective of the *Provincial Policy Statement* to protect or enhance surface water quality, including the function of headwaters.

Surface water features form an important part of the natural, economic and cultural landscape in the Analysis Area. This area is bordered by Lake Erie to the south and Lake Ontario to the north. It includes Hamilton Harbour and Cootes Paradise in the City of Hamilton. There are a few smaller inland lakes and reservoirs, including Lake Gibson / Moody Lake and Lake Niapenco.

There are numerous watercourses in the Analysis Area as illustrated on Figure 3. The two major river systems are the Niagara River and the Welland River (itself a component of the Niagara River watershed). Other large streams include Red Hill Creek, Twelve Mile Creek, Sixteen Mile Creek, Twenty Mile Creek and Forty Mile Creek. Smaller tributary creeks are abundant, especially in central

0 2.5 5
Kilometers

High Potential Groundwater Recharge Area
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 3:
Surface & Groundwater

Niagara Region, contributing primarily to the Welland River and Twenty Mile Creek. These smaller creeks include Black, Beaver, Frenchman, Chippewa, Spring, and Little Forks Creeks in Niagara Region and Grindstone, Shoreacres, Tuck and Spencer creeks in Halton and Hamilton.

Aquatic systems in the Analysis Area are a mix of coldwater, warmwater urbanized, warmwater baitfish and warmwater sportfish. The majority of the systems are classified as warmwater, including the Welland River and larger streams. There are several creeks classified as coldwater for at least some of their length: Upper Bronte Creek, Grindstone Creek, Spencer Creek and Twelve Mile Creek (the only coldwater system in Niagara Region). Some of these support coldwater trout populations. Although the type of stream is not critical in making broad corridor decisions it will be important at the route assessment stage.

The Niagara River (including the Welland River watershed) is a Great Lakes "Area of Concern" (AOC), with a Remedial Action Plan designed to protect and restore fish and wildlife habitat (e.g. the Welland River Fragile Land Restoration Program, which aims to re-vegetate riparian areas along the Welland River system);

6.4 Agricultural Lands

The preservation of prime agricultural lands has been identified as a priority by the Province of Ontario (Section 2.1.1, *Provincial Policy Statement*, 1996), the Regional Municipality of Hamilton-Wentworth (Section 2.1.1, *Official Plan*, 1995) , the Regional Municipality of Niagara (*Official Plan*, 1998) and the Regional Municipality of Halton (*Official Plan*, 1995). Prime agricultural lands are defined as lands suitable for crop/livestock production or where agricultural soil Classes 1 to 4 predominate. These agricultural lands are abundant in Niagara Region and present to a lesser extent in Hamilton and Halton.

This Analysis Area is of agricultural importance because of the presence of Niagara's Provincially and Nationally significant *tender fruit lands*. A unique combination of sandy soils and a favourable microclimate makes certain areas suitable for growing grapes and tender fruits. These tender fruit and grape growing areas are concentrated between Beamsville and St. Catharines in the Lake Ontario Plain north of the Niagara Escarpment, with local areas on slopes of the escarpment and near Fonthill. See Figure 4 - Agriculture. These conditions are unique and, as a result, this is the most intensively developed horticultural area in Canada.

According to Regional Niagara's Official Plan (1998), tender fruit lands and grape growing areas have the highest priority for preservation. Agricultural uses predominate, with agricultural related and some compatible uses permitted (e.g. forestry and flora/fauna conservation). Non-agricultural uses including estate development, are strictly limited, with exceptions considered on an individual basis.

The second highest priority for preservation is accorded general agricultural lands suitable for dairy farming (brow of escarpment, better drained soils) and production of corn, hay, oats, wheat, barley and soybeans (on the Haldimand Clay Plain). These specialty croplands are uncommon in Ontario (and Canada) and considered "unique agricultural areas" (Regional Niagara Official Plan, 1998).

Tender fruit crop and specialty crop areas should be avoided by transportation facilities, as stated in the Regional Niagara Official Plan (1998):

> "The Region will support the provision of improved transportation facilities south of the Niagara Escarpment, including an investigation of the need, alignment and timing for a

0 2.5 5
Kilometers

Tender Fruit Land
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 4:
Agriculture

mid-peninsula transportation corridor as a means to preserve unique agricultural lands and to encourage development south of the Escarpment"

6.5 Environmentally Significant or Sensitive Features

Environmentally significant features include areas which have been designated as a provincially significant wetland, Area of Natural and Scientific Interest (ANSI) or Environmentally Sensitive Area (ESA). Within the Analysis Area, significant natural features are located primarily along natural corridors (rivers and landforms). In addition there are a few isolated blocks located across the area. The most prominent natural areas include:

- Niagara Escarpment;
- Niagara River;
- Welland River corridor;
- Twenty Mile Creek corridor;
- Short Hills Provincial Park;
- Wainfleet Marsh (and bog);
- Humberstone Marsh;
- Willoughby Marsh;
- Lyon's Creek corridor;
- Sixteen Mile Creek corridor; and
- Ten Mile Creek corridor.

6.5.1 Provincially Significant Wetlands (PSWs)

Wetlands are defined in the *Provincial Policy Statement* (*Natural Heritage Reference Manual)* as follows:

> *"Wetlands mean lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens."*

A significant wetland is:

> *"an area identified as provincially significant by the Ministry of Natural Resources using evaluation procedures established by the province, as amended from time to time."*

Some of the functions wetlands provide are as follows:

- groundwater recharge / discharge;
- flood attenuation through water storage;
- wildlife movement corridors;
- tourism and recreation opportunities;
- habitat for flora and fauna;
- shoreline stabilization and erosion reduction; and

- water filtration.

(Source: Natural Heritage Reference Manual, section 2.2)

Due to their ecological value, development and site alteration is prohibited in wetlands south and east of the Canadian Shield. Figure 5 illustrates vegetation and wetlands within the Analysis Area.

Wetlands in the Analysis Area

Abundant PSWs (in addition to locally significant wetlands) are scattered throughout the Analysis Area along riparian systems, as isolated blocks or as components of a wetland complex. Although the majority are found in Niagara Region, there are numerous swamp complexes and riparian associated wetland areas in Hamilton and Halton Region.

Typically, wetlands in the Analysis Area are swamp dominant, with a small to moderate marsh component. Occasionally, wetlands are marsh dominant or exclusively marsh habitat. In addition, the abundant slough forest blocks found in central Niagara region are frequently classified as PSWs.

There are several areas with a high concentration of PSWs:

- Around Fort Erie - this area has an abundant, tight cluster of primarily swamp dominant/exclusive wetlands with occasional marsh;

- Fonthill / Welland area - this area has relatively fewer wetlands in a loose cluster. They are typically swamp dominant and frequently associated with riparian systems including the Welland River;

- Between Twenty Mile Creek and the upper Welland River - this central area has an abundance of tightly clustered individual wetlands and wetland complexes. They are typically swamp dominant with some marsh and frequently include slough forest blocks. These wetlands are often associated with Welland River tributary creek headwaters;

- Between Highway 8 and Highway 6 in the northwest section of the City of Hamilton - the most abundant habitat type is swamp, often found in large complexes of many smaller units.

Notable wetlands in the area include:

- Wainfleet Marsh southwest of Welland (1030 ha wetland with bog, fen, marsh and swamp components);
- Humberstone Marsh south of Welland (381 ha Life Science Site with marsh and swamp components);
- Willoughby Marsh north of Fort Erie(362 ha swamp/marsh);
- Jordan Station Marsh between Beamsville and St. Catharines (136 ha coastal marsh);
- Cootes Paradise in Hamilton / Dundas (122 ha coastal wetland complex of swamp and marsh habitat);
- Beverly Swamp in Falamborough, 2324 ha Life Science Site);
- Medad Valley Swamp (213 ha wetland - swamp/marsh);
- Fletcher Creek Swamp Forest (526 ha swamp);
- Hayesland-Christie Wetland Complex in Flamborough (1473 ha wetland complex dominated

0 2.5 5
Kilometers

Woodlands
Wetlands
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 5:
Wetlands & Woodlands

by swamp); and
- Sheffield-Rockton Wetland Complex (735 ha complex of smaller, swamp dominant blocks).

6.5.2 Areas of Natural and Scientific Interest (ANSIs)

ANSIs are:

> *"Areas of natural and scientific interest means areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education." (Provincial Policy Statement Definition)*

Significant ANSIs are:

> *"areas identified as provincially significant by the Ministry of Natural Resources using evaluation procedures established by the province, as amended from time to time." (Provincial Policy Statement Definition)*

Avoidance of development in ANSIs is encouraged, but the *Provincial Policy Statement* permits transportation facilities in ANSIs if there are no negative impacts to the natural features or ecological functions for which the area is identified.

There are two types of ANSIs: Life Science and Earth Science.

Life Science ANSIs are dynamic ecosystems that are representative examples of the biodiversity and natural landscapes in Ontario (e.g. valleys, wetlands, forests, native flora and fauna).

Earth Science ANSIs are representative examples of geological processes in Ontario (e.g. exposed bedrock on road cuts, fossils and landforms). Earth Science ANSIs are considered to be less sensitive to development and site alteration and their ecological function does not need to be considered during impact assessments (*Provincial Policy Statement, Natural Heritage Reference Manual, Section 2.8 b*).

Two levels of ANSI significance are recognized: Provincially or Regionally Significant. In the Provincial Policy Statement, only Provincially ranked ANSIs are considered "significant". However, Regionally Significant ANSIs have local importance.

ANSIs in the Analysis Area

There are more than 75 Provincially or Regionally Significant ANSIs scattered throughout the Analysis Area. They are more prevalent along the Niagara Escarpment and often associated with riparian systems. The most abundant type of ANSI found in the area are small blocks of *slough forest* (wet forest / swamp), prevalent in the Haldimand Clay Plain south of the Niagara Escarpment, especially around Fonthill to Smithville. The other major ANSI habitat types are *forest*, *escarpment related*, *wetland*, *marsh*, *swamp* or *woodlot*. Escarpment related sites are abundant from Grimsby to the Niagara River and include features such as terraces, gorges and waterfalls. Swamp dominated wetlands are also abundant throughout the area with several zones of high concentration.

Although moderately abundant, provincial ANSIs occupy a relatively small percentage of the total area and few large ANSIs are present. See Figure 6 – Areas of Natural and Scientific Interest (ANSI). Some

0 2.5 5
Kilometres

Provincial - Life Science
Provincial - Earth Science
Regional - Life Science
Regional - Earth Science
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 6:
Areas of Natural and Scientific Interest

Note: Mapping is incomplete across the City of Hamilton

of the larger / more significant provincial ANSIs in the Analysis Area are as follows:

- Cootes Paradise – Life Science;
- Spencer Gorge – Life Science;
- Sassafras - Waterdown Woods – Life Science;
- Medad Valley - Life Science/Earth Science;
- Sulphur Creek Valley – Life Science;
- Dundas Valley Forests and Summit Bog – Life Science/Earth Science;
- Beamsville Escarpment – Life Science;
- Jordan Valley – Life Science/Earth Science;
- Niagara Section Escarpment at Grimsby – Life Science;
- Short Hills Provincial Park –Life Science;
- 15/16 Mile Creek Valleys – Life Science;
- St. John's- Fonthill Valleys – Life Science;
- Beverly Swamp Life Science;
- Niagara Gorge – Life Science;
- Humberstone Muck Basin Swamp Forest – Life Science; and
- Willoughby Clay Plain Forest – Life Science.

6.5.3 Environmentally Sensitive Areas (*ESAs*)

Environmentally Sensitive Areas are not included in the *Provincial Policy Statement*, but are often associated with other features subject to the policy statement (e.g. PSWs or ANSIs). They are also reflected in the Ontario Ministry of Natural Resources (MNR) Land Use Guidelines, Conservation Authority Plans and municipal land use plans. The Regional Official Plans for Niagara, Hamilton and Halton also identify ESAs.

Environmentally Sensitive Areas are generally land or water based natural resources that are deemed significant by a local / regional planning authority because they meet a combination of several criteria, such as: unique habitat, rare species, large size, diverse native life forms, habitat for indigenous organisms, important ecological or hydrological function or rare / poorly represented earth science feature. Often ESAs are also classified as PSWs or ANSIs. Environmentally Sensitive Area is a term sometimes used interchangeably with "Environmentally Significant Area".

Environmentally Sensitive Areas are scattered throughout the Analysis Area, (see Figure 7 – Environmentally Sensitive Areas) but are almost entirely absent from intensively developed agricultural areas (i.e. the tender fruit belt on the Lake Ontario Plain). There is an approximately equal mix of significant ESAs (escarpment related, Wainfleet, Willoughby and Humberstone marshes, Shorthills Provincial Park, riparian corridors and sensitive or significant smaller woodlots) and marginally sensitive areas (primarily slough forest and small woodlots).

6.6 Woodlands

Woodlands are defined as:

> *".... treed areas that provide environmental and economic benefits such as erosion prevention, water retention, provision of habitat, recreation and the sustainable harvest*

0 2.5 5
Kilometers

Environmentally Sensitive Areas
Shoreline Policy Areas
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 7: Environmentally Sensitive Areas

Note: ESA boundaries are approximate

> *of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance." (Provincial Policy Statement, 1997)*

Criteria that have been applied to woodlot quality assessments are: size, significant natural features (i.e. rare species or rare species habitat), age (e.g. > 100 years old), presence of interior forest habitat and linkage with other natural areas. One other criterion used to assess woodlot significance is the relative abundance of other woodlots within the Analysis Area (i.e. if there are relatively few woodlots, a smaller woodlot is more significant). The percentage of forest cover in the assessment area is approximately 13.8% in Hamilton and 13.9% in Niagara (Reid and Symmes, 1997). Figure 5 illustrates wetlands and woodlands within the Analysis Area. Based on the percentage of forest cover, woodlands over 4 ha in size are considered significant.

In the Analysis Area, many woodlands are recognized as either regionally or provincially significant features (ESAs or ANSIs). Wet forests are in fact the most abundant type of natural feature in the region and located mainly on the Haldimand Clay Plain south of the Niagara Escarpment.

Numerous "Older Growth Forest" sites have been identified within the Region of Niagara, describing features with notable communities of 80-100 year old trees. They are typically associated with river systems, distinct land forms (e.g. the Niagara Escarpment, Fonthill Kame) or other environmentally designated and protected areas such as provincially significant ANSIs.

The "Older Growth Forest" designation is used in natural heritage planning as an important criteria for designating significant forest resources in Niagara Region.

6.7 Carolinian Canada Sites

Nine environmental features within the Analysis Area have been previously identified as critical unprotected areas by Carolinian Canada (a program initiated out of concern for the loss of natural vegetation and species in the Life Zone). These sites typically are associated with environmental designated areas such as ANSIs, PSWs or ESAs and will likely be core areas within a natural heritage planning framework. The nine Carolinian Canada sites are spread throughout the Analysis Area and associated with no particular physiographic feature in the landscape. They are as follows:

- ***Sassafras Woods***, a 133 ha upland forest on the clay valleys south of the Niagara Escarpment with Carolinian species such as Sassafras and Flowering Dogwood near their northern limit (Region of Halton ESA # 4, Provincial Life Science ANSI);

- ***Beverly Swamp***, a 2324 ha swamp - treed bog - alvar - marsh - forest - aquatic complex in west Hamilton (Provincial Life Science ANSI, PSW, Hamilton–Wentworth ESA #17, Significant Natural Area, International Biological Program site [IBP]);

- ***Dundas Valley***, a 2100 ha area of varied topography on a mix of natural areas, agricultural fields and rural residential properties (Hamilton-Wentworth ESA #41, Provincial Life Science ANSI Provincial Earth Science ANSI, Niagara Escarpment Plan Area [NEPA], IBP site);

- ***Grimsby-Winona Escarpment and Beamer Valley***, a 325 ha upland mixed forest site with typical escarpment geologic features (Life Science Site, ESA GR-07);

- ***Jordan Escarpment Valley***, a 152 ha escarpment/terrace valley with upland forests, waterfalls and other geomorphological features; Lake Ontario Plain drowned meander valley (Provincial Life Science ANSI, Provincial Earth Science ANSI) ;

- ***Caistor-Canborough Slough Forest***, a 1944 ha complex of wetlands and slough forest blocks separated by agricultural land (Life Science Site, PSW);

- ***Fonthill Sandhill Valley***, a 73 ha representative example of Short Hills forest types and kame/delta sandland features of the Fonthill Area (Provincial Life Science ANSI);

- ***Willoughby Clay Plain***, a 123 ha clay plain muck basin forest with aquatic, swamp, scrub and marsh communities (PSW, Provincial Life Science ANSI, Life Science Site, ESA NF-11/12);

- ***Point Albino Peninsula Sandland Forest***, a 210 ha representative area of Lake Erie coastal shoreline with wetlands, dune ridges and forest (PSW, IBP site, Life Science Site, ESA FE-11).

6.8 Parks and Conservation Authority Lands

Provincial Parks, City Parks and Conservation Areas include many important natural features within the Analysis Area. Figure 8 shows the location of key parks in the assessment area. Frequently, these natural features are isolated islands surrounded by development. As such, they are key refuge areas and wildlife movement corridors. Within the Analysis Area, parks and conservation areas are most abundant along the Niagara Escarpment (e.g. Beamer Memorial Conservation Area, Cave Springs, Ball's Falls Conservation Area, Woodend Conservation Area, Queenston Heights) and associated with aquatic systems (e.g. Lake Ontario, Lake Erie, reservoirs, Niagara River, Welland River and Twelve Mile Creek).

Some of the more significant parks include:

- Short Hills Provincial Park;
- Wainfleet Bog Provincial Nature Reserve;
- Red Hill Valley Park;
- Centennial and King's Forest Municipal Parks;
- Willoughby Marsh;
- Dundas Valley;
- Vinemount and Beamers Falls Conservation Areas; and
- Spencer Gorge Wilderness Area.

6.9 Unique Features

There are several unique features within the Analysis Area that warrant special mention because of their environmental, cultural or historical importance. As they are specific to a region or project, they are not necessarily mentioned in the *Provincial Policy Statement*. They are as follows:

0 2.5 5
Kilometers

Conservation Areas
Federal Lands
Private Lands
Niagara Parks Commission
Provincial Parks
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 8:
Parks & Conservation Authority Lands

6.9.1 The Niagara Escarpment

This natural landform is a prominent feature along the QEW corridor just south of Lake Ontario (see Figure 9 – Niagara Escarpment). Within the Analysis Area, the escarpment extends from Queenston Heights in Niagara-on-the-Lake through the City of Hamilton and north towards the Bruce Peninsula. It has significance for many reasons, including the following:

- X The Niagara Escarpment is classified as a *UNESCO World Biosphere Reserve*, its management governed by the Niagara Escarpment Commission (NEC) and the *Niagara Escarpment Plan*;
- X Escarpment sites are the second most abundant group of natural features in the Analysis Area and include geological formations (exposed rock faces, waterfalls, gorges, quarries), ANSIs and ESAs, conservation areas and parks, wooded areas, aquatic systems, rare species and habitat for significant species;
- X The escarpment forms an important natural barrier / physical division between the Lake Ontario Plain below (to the north) and the Haldimand Clay Plain above the escarpment (to the south);
- X The escarpment provides tourism and outdoor recreation opportunities in the region (e.g. Bruce Trail, scenic viewpoints, wildlife viewing opportunities);
- X Highlighted areas include: Niagara Gorge, St. Davids, Queenston Heights, Woodend, Short Hills / Fonthill Kame, Decew Falls, Rockway Cataracts/Gorge, Louth Waterfalls, Balls Falls, Beamer's Falls, Cave Springs, Jordan Valley terraces / wetland; Mountainview (Thirty Mile Creek) Cliffs/Terraces and Spencer Creek Falls.

6.9.2 Wainfleet Marsh and Bog

This large and diverse area includes a section of the Onondaga Escarpment, Mud Lake and remnant marsh / bog habitat. Wainfleet Bog is the largest block of organic swamp in Niagara Region and contains numerous significant species (e.g. Massassauga Rattlesnake, Blandings Turtle) and vegetation communities (e.g. Peat Bog).

This is also an area that has undergone dramatic hydrologic alteration as a result of ongoing peat extraction. These drainage changes have resulted in significant changes to the vegetation communities and dependent wildlife.

6.9.3 Welland Canal

The Welland Canal is a prominent feature of the landscape in eastern Niagara Region. The canal is an integral part of the St. Lawrence Seaway that links the Great Lakes with international waters. The canal is of regional importance for its historical, cultural and economic value.

The current canal, built in 1932 provides passage for large cargo ships traveling between Lake Ontario (at Port Weller in St. Catharines) and Lake Erie (Port Colborne). In addition to the economic value (employment, operation fees), the canal provides recreation and tourism opportunities along the scenic

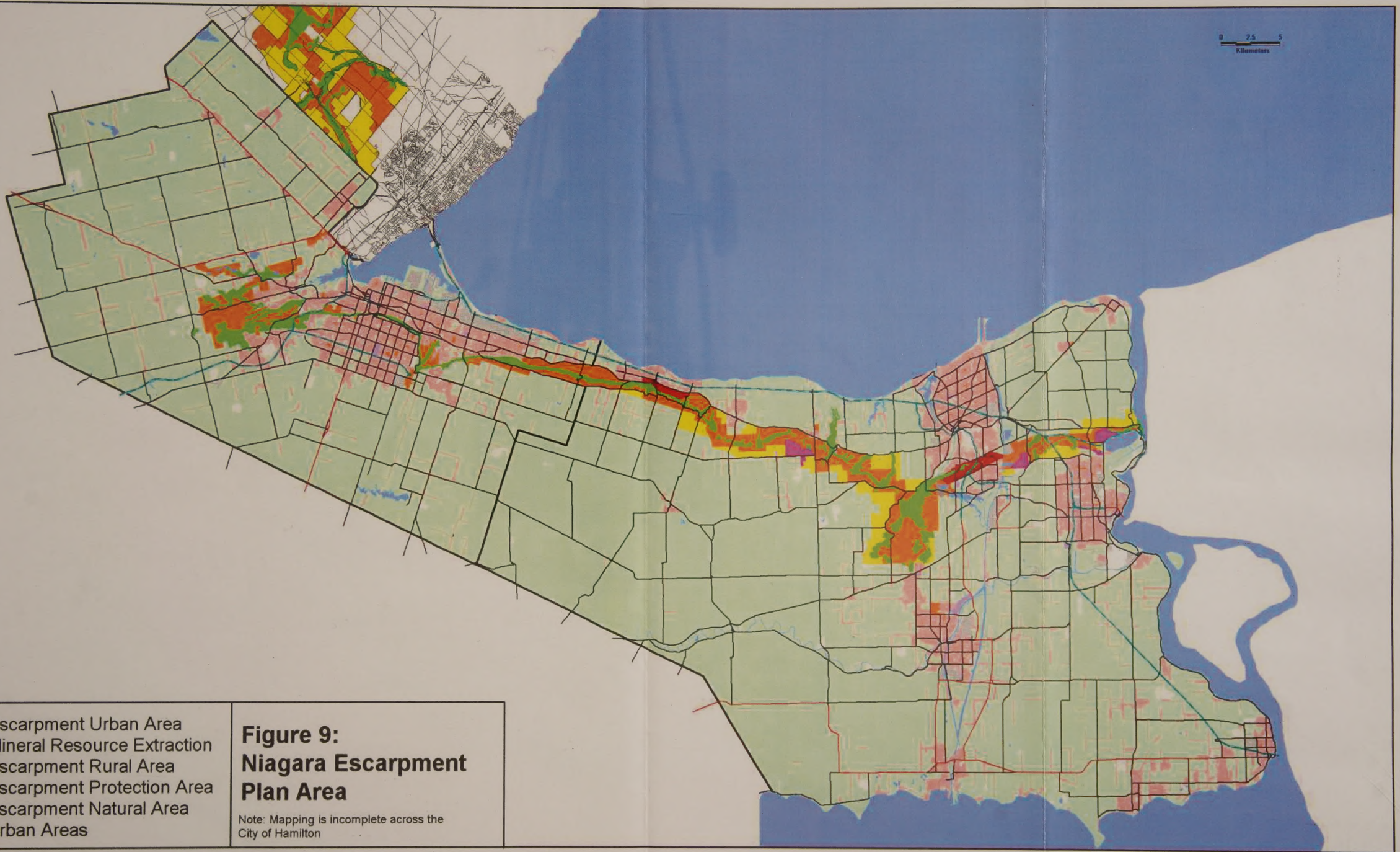


Figure 9:
Niagara Escarpment Plan Area

Note: Mapping is incomplete across the City of Hamilton

canal drives and pathways as well as a museum and viewing opportunities at Lock 3.

There is some ecological value associated with the canal, in wetland areas along its banks. These areas provide some habitat for waterfowl and aquatic species.

6.9.4 Quarries

Quarries may be considered as unique spaces within the Analysis Area because of their geological and ecological value. Quarries are often associated with Earth Science ANSIs because they provide good examples of geologic history in cut rock faces. In addition, they may have ecological value as regenerating habitats (forest, wetland, prairie) and for wildlife habitat or movement.

Some of the more significant quarries in the Analysis Area are located along the Niagara Escarpment and near Lake Erie. They include Queenston Quarry, Vineland Quarry, Ridgemount Quarry (Fort Erie), Humberstone Quarry (Port Colborne) and Port Colborne Quarry.

6.10 Community Features

Within the Analysis Area, most existing urban development is located between the Niagara Escarpment and Lake Ontario (Hamilton, Stoney Creek, Grimsby, St. Catharines, Niagara-on-the-lake, Niagara Falls) and at the southwestern corner of Niagara Region (Welland, Fort Erie, Port Colborne).

The area south of the Niagara Escarpment is primarily rural with numerous small towns, hamlets and villages throughout. This area is dominated by active farming and idle lands.

7.0 ASSESS ROADWAY ALTERNATIVES

7.1 Introduction

Two main roadway alternatives satisfied the transportation criteria and were carried forward for assessment as to their environmental feasibility. These alternatives are:

- Widen the QEW to 8 lanes; and
- Construct a new four lane east-west freeway (Mid-Peninsula Corridor) south of the escarpment. This corridor has the following two alternative locations for crossing the Welland River (see Figure 11):
  - MPC Alternative "C" - passing south of Welland, connecting to the QEW in the vicinity of Netherby Road; and
  - MPC Alternative "D(2)" - passing between the Welland and Fonthill, connecting to the QEW in the vicinity of Lyon's Creek Road.

An evaluation of the three alternatives is presented in Table 3.

Niagara Peninsula Transportation Needs Assessment Study
Evaluation of Roadway Alternatives

Table 3

Criteria/Sub-factors	Widen QEW to 8 Lanes	MPC Alternative "C"	MPC Alternative "D(2)"
Symbol legend: Worst ○ Best ●			
Groundwater Quality & Quantity *Quantitative & Qualitative Assessments* • Soils that are susceptible to infiltration and therefore contamination.	• Approximately 11 km of the QEW crosses an area between Victoria Ave. in the Town of Lincoln and the City of St. Catharines that the Ministry of the Environment (MOE) has identified as having generally high susceptibility to contamination. ◑	• Most of this corridor can avoid the areas having higher potential for groundwater contamination through infiltration. • Passes between the two zones that the MOE has identified as having generally high susceptibility to contamination. ◑	• Most of this corridor can avoid the areas having higher potential for groundwater contamination through infiltration. • Passes through the Welland-Fonthill gap crossing a zone that the MOE has identified as having generally high susceptibility to contamination. ◑
Surface Water Quality and Quantity *Quantitative & Qualitative Assessments* • Permanent watercourses and significant valleylands.	• The QEW between the Burlington Skyway and Hwy 406 has been constructed to accommodate 8 lanes. The watercourse crossings have been sized accordingly and therefore widening to 8 lanes will have minimal impact on the watercourses and valleys in this section. • The QEW through St. Catharines to Hwy 420 is scheduled to be upgraded to 6 lanes with protection for 8 lanes. Therefore the ultimate widening to 8 lanes will have minimal effects on the watercourses and valleys in this section. • Increased drainage from the addition of 2 additional lanes in each direction will increase the discharge of stormwater to local watercourses. The introduction of Best Management Practices (BMPs) will reduce the adverse effects of roadway drainage. ◔	• The corridor has approximately 100 potential crossings. • The corridor crosses the tributaries or main branches of numerous watercourses. The majority of the crossings are likely to be minor because they are in the upper reaches of the watersheds. The watercourses include: •Twenty Mile Creek •The Welland River •Tea Creek • North Creek • Big Creek • Spencer Creek • The most significant crossing is the Welland River west of the Town of Welland. • Any potential impacts to these watercourses can be minimized by avoiding as many crossings as possible, crossing at areas of low sensitivity and spanning the watercourses where practical. ◑	• The corridor has approximately 100 potential crossings. • The corridor crosses the tributaries or main branches of numerous watercourses. The majority of the crossings are likely to be minor because they are in the upper reaches of the watersheds. The watercourses include: •Twenty Mile Creek •The Welland River •Tea Creek • North Creek • Big Creek • Spencer Creek • The most significant crossing is the Welland River east of the Town of Welland. • Any potential impacts to these watercourses can be minimized by avoiding as many crossings as possible, crossing at areas of low sensitivity and spanning the watercourses where practical. ◑
Agricultural Lands *Quantitative & Qualitative Assessments* • Tender Fruit Lands • Specialty crop lands • Class 1,2,3 soils in areas generally lacking productive agricultural lands.	• The widening to 8 lanes can generally be accommodated within existing right-of-way (ROW) except at interchanges. This will have a small and direct impact on tender fruit lands. • Ongoing dependence on the QEW as the only east-west freeway in the region will place continued development pressures on the tender fruit lands to the north of the Niagara Escarpment. This threatens these lands over the long-term. ○	• Avoids all tender fruit and specialty croplands. • The corridor has the potential to affect Class 1,2,3 soils. Since most of the lands affected fall into this category, the potential impacts is approximately 1300 ha of Class 1,2,3 soils. (assumes 100 m wide corridor, interchanges and grade separations) • This route will encourage development in Niagara Region to the south, drawing development pressures away from the QEW corridor and the tender fruit lands along the QEW. It will however encourage development on the Class 1-3 lands along the MPC. • For the most part, a route can be selected that utilizes existing power corridors or follows lot/concession lines thereby reducing potential farm severances. ◔	• Avoids all tender fruit and specialty croplands. • The corridor has the potential to affect Class 1,2,3 soils. Since most of the lands affected fall into this category, the potential impacts is approximately 1300 ha of Class 1,2,3 soils. (assumes 100 m wide corridor, interchanges and grade separations) • This route will encourage development in Niagara Region to the south, drawing development pressures away from the QEW corridor and the tender fruit lands along the QEW. It will however encourage development on the Class 1-3 lands along the MPC. • For the most part, a route can be selected that utilizes existing power corridors or follows lot/concession lines thereby reducing potential farm severances. ◔

Niagara Peninsula Transportation Needs Assessment Study
Evaluation of Roadway Alternatives

Table 3

Criteria/Sub-factors	Widen QEW to 8 Lanes	MPC Alternative "C"	MPC Alternative "D(2)"
Wetlands Quantitative & Qualitative Assessments • Provincially Significant Wetlands south and east of the Canadian Shield.	• The widening to 8 lanes will not require any additional property beyond land required for interchanges and therefore are not expected to have any direct effects on wetlands. • Increased drainage from the addition of 2 additional lanes in each direction will increase the discharge of stormwater to local wetlands. The introduction of BMPs will reduce the adverse effects of roadway drainage.	• Avoids most provincially significant wetlands. There is the potential to adversely affect small portions of Provincially Significant Wetlands (PSWs) in the area south-east of Smithville, south-east of Orkney near Hamilton and west of Waterdown. • Most of the wetlands and wetland complexes south of the Escarpment between Hamilton and Fort Erie, are oriented east-west, parallel to the roadway. This increases the opportunities to avoid these wetlands. • In the area around Hamilton, the possibility of impacting a wetland is increased by the number of wetland complexes north-west of Waterdown, and the limited routing possibilities. • The section crossing the Welland Canal and connecting to the QEW has the potential to affect three wetlands however, these impacts should be able to be minimized during a route planning EA. • Approximately 160 ha of the MPC corridor contains wetlands.	• Avoids most provincially significant wetlands. There is the potential to adversely affect small portions of PSWs in the area south-east of Smithville, south-east of Orkney near Hamilton and west of Waterdown. • Most of the wetlands and wetland complexes south of the Escarpment between Hamilton and Fort Erie, are oriented east-west, parallel to the roadway. This increases the opportunities to avoid these wetlands. • In the area around Hamilton, the possibility of impacting a wetland is increased by the number of wetland complexes north-west of Waterdown, and the limited routing possibilities. • The section crossing the Welland Canal and connecting to the QEW via the Fonthill-Welland gap has the potential to affect two wetlands however, these impacts should be able to be minimized during a route planning EA. • Approximately 110 ha of the MPC corridor contains wetlands.
National, Provincial, and Conservation Authority Parks *Quantitative & Qualitative Assessments*	• The widening to 8 lanes will not require any significant additional property beyond that which has been identified for the ongoing projects and the interchange improvements, which are not expected to have any direct effects on parks.	• This corridor is unlikely to affect any provincial and national parks. • The corridor passes nearby the Binbrook Tract, Gainsborough and E.C. Brown Conservation Areas. These Conservation Areas are relatively small and should be able to be avoided by any route.	• This corridor is unlikely to affect any provincial and national parks. • The corridor passes nearby the Binbrook Tract, Gainsborough and E.C. Brown Conservation Areas. These Conservation Areas are relatively small and should be able to be avoided by any route.
Unique Spaces *Quantitative & Qualitative Assessments* • Niagara Escarpment	• The widening to 8 lanes will not require any significant additional property beyond that which has been identified for ongoing projects and the interchange improvements, which are not expected to have any direct effects on the Niagara Escarpment Lands.	• The corridor only crosses the Niagara Escarpment at one location – northwest of Waterdown. There is a section of the escarpment that has a gentle slope and is in agricultural use. Therefore it is expected that a crossing location can be identified that has limited impact to the escarpment. • Approximately 25 ha of Escarpment Rural lands will be crossed.	• The corridor only crosses the Niagara Escarpment at one location – northwest of Waterdown. There is a section of the escarpment that has a gentle slope and is in agricultural use. Therefore it is expected that a crossing location can be identified that has limited impact to the escarpment. • Approximately 25 ha of Escarpment Rural lands will be crossed.

Niagara Peninsula Transportation Needs Assessment Study
Evaluation of Roadway Alternatives

Table 3

Criteria/Sub-factors	Widen QEW to 8 Lanes	MPC Alternative "C"	MPC Alternative "D(2)"

Community Features
Quantitative & Qualitative Assessments
• Existing developed areas and planned urban expansion
	• The increased traffic volumes and addition of lanes will move higher volumes of traffic closer to residential properties through urbanized areas.
	• The QEW passes through:
	  • Hamilton
	  • Stoney Creek
	  • Grimsby
	  • St. Catharines
	  • Niagara Falls
	  • Fort Erie
	• From the Freeman Interchange to the Burlington Skyway property is required for interchanges.
	• From Burlington Skyway to Highway 406 sufficient property is available for 8 lanes.
	• Widening the QEW to 8 lanes through St. Catharines would impact about 100 homes.
	• From the Garden City Skyway to Highway 420 the property for the interchanges needs to be acquired.
	• Between Hamilton and Hwy. 420 in Niagara Falls approximately 8.7 km of residential areas are adjacent to the QEW on the north side, and 2.5 km on the south side.
	• Many areas are or will be protected by noise barriers.
		• The major urban areas are in the vicinity of Hamilton and Welland. There are small communities dispersed throughout the study area and private farms, homes and small business along many of the roadways in the study area.
		• Approximately 450 ha are designated urban area within the corridor.
		• The corridor avoids most larger urban areas. It passes close to the west side of Waterdown where it could have negative effects on private homes. It could also adversely affect Flamborough Downs. The other urban area potentially affected is the southern edge of Welland. This area is in industrial-commercial land use and has low sensitivity to the nuisance effects of a major transportation facility.
			• The major urban areas are in the vicinity of Hamilton and Welland. There are small communities dispersed throughout the study area and private farms, homes and small business along many of the roadways in the study area.
			• Approximately 725 ha are designated urban area within the corridor.
			• The corridor avoids most larger urban areas. It passes close to the west side of Waterdown where it could have negative effects on private homes. It could also adversely affect Flamborough Downs. The other urban area potentially affected is where the corridor passes north of Port Robinson and then between Welland and Fonthill. These areas include residential and institutional land uses and have high sensitivity to the nuisance effects of a major transportation facility. This corridor also has the potential to affect the Niagara Regional Fair Grounds in Welland.

Areas of Natural and Scientific Interest (ANSIs) *Quantitative & Qualitative Assessments*	• The QEW crosses 3 Provincial Life Science ANSIs (Eighteen Mile Creek, Sixteen Mile Creek and Fifteen Mile Creek) and passes close to the Woodend Conservation Area (Regional Life Science ANSI) near Hwy. 420. It also crosses an Earth Science/Life Science ANSI at Jordan Harbour. • The widening to 8 lanes will not require any significant additional property beyond that which has been identified for the ongoing projects and the interchange improvements which are not expected to have any direct effects on ANSIs.	• The corridor does not include any provincial ANSIs. • The corridor passes near one Provincial Life Science/Earth Science ANSI – the Medad Valley near Waterdown. • There are several Regionally Significant Life Science ANSIs along the corridor in the Region of Niagara. These are associated with wetlands. • The ANSIs are relatively isolated and should be able to be avoided during the route-planning phase of any proposed facility. • Does not affect any more ANSIs than does MPC "D(2)".	• The corridor does not include any provincial ANSIs. • The corridor passes near one Provincial Life Science/Earth Science ANSI – the Medad Valley near Waterdown. • There are several Regionally Significant Life Science ANSIs along the corridor in the Region of Niagara. These are associated with wetlands. • The ANSIs are relatively isolated and should be able to be avoided during the route-planning phase of any proposed facility. • Does not affect any more ANSIs than does MPC "C".

Niagara Peninsula Transportation Needs Assessment Study
Evaluation of Roadway Alternatives

Table 3

Criteria/Sub-factors	Widen QEW to 8 Lanes	MPC Alternative "C"	MPC Alternative "D(2)"
Environmentally Sensitive Areas (ESAs) *Quantitative & Qualitative Assessments*	• The ESAs along the QEW are associated with other natural features including ANSIs, significant river valleys, wetlands and the Niagara Escarpment. • The widening to 8 lanes will not require any additional property beyond that which has been identified for ongoing projects, other than land for interchanges and therefore has no direct effects on these ESAs.	• The corridor crosses the Welland River ESA west of Welland, as identified in the Region of Niagara Official Plan. However, it is likely that a low impact crossing location can be identified and that any impacts can be mitigated. • The corridor passes close to ESAs in the City of Hamilton, specifically in the vicinity of Orkney, Peters Corners, and Waterdown. • A route can likely be located to avoid or minimize the potential impacts to all ESAs. • The section of the corridor between Hwy. 403 and Hwy. 407 will remove approximately 5 ha of ESAs.	• The corridor crosses the Welland River ESA east of Welland, as identified in the Region of Niagara Official Plan. However, it is likely that a low impact crossing location can be identified and that any impacts can be mitigated. • The corridor passes close to ESAs in the City of Hamilton, specifically in the vicinity of Orkney, Peters Corners, and Waterdown. • A route can likely be located to avoid or minimize the potential impacts to all ESAs. • The section of the corridor between Hwy. 403 and Hwy. 407 will remove approximately 5 ha of ESAs.
Woodlands *Quantitative & Qualitative Assessments* • South & east of the Canadian Shield • Significance of a woodland area is related to the abundance within the Assessment Area.	• There are limited woodlands along the QEW and therefore any intrusion into existing woodlands can be significant. • The widening to 8 lanes will require additional property interchange improvements and 8 lanes through St. Catharines. These are not expected to have any direct effects on woodlands.	• There are numerous small woodlands scattered throughout the study area. The proposed corridor contains 1460 ha of woodlands within the 1 km wide corridor identified for analysis purposes. Most of these are sufficiently dispersed that they can be avoided. However, it is likely that some woodlands will be impacted. • In the highly constrained section around Hamilton the corridor is likely to result in removal of some woodlands.	• There are numerous small woodlands scattered throughout the study area. The proposed corridor contains 1400 ha of woodlands within the 1 km wide corridor identified for analysis purposes. Most of these are sufficiently dispersed that they can be avoided. However, it is likely that some woodlands will be impacted. • In the highly constrained section around Hamilton the corridor is likely to result in removal of some woodlands.
Summary: Environmental Criteria	• **The impacts of widening the QEW to 8 lanes between Hamilton and Highway 406 are minimal due to the existing right-of-way.** • **Widening the QEW to 8 lanes through ST. Catharines would result in the loss of approximately 100 homes.** • **Widening the QEW will result in indirect impacts on the tender fruitlands, due to increased development pressure that will occur in this area because of the lack of an alternate east-west expressway.**	• **The MPC-South corridor has a high potential for causing direct environmental impact since it represents a new corridor.** • **This corridor has lower impacts to community features in the Niagara Region than MPC "D(2)" because it passes adjacent to industrial and commercial land uses in Welland.** • **There will be high impact to general agricultural lands since the majority of the peninsula is good quality agricultural lands.** • **A corridor across the peninsula can likely be located to minimize impacts to natural features because of the large separations between these features and the fact that they are predominantly oriented in and east-west direction.** • **The route around Hamilton has the potential to adversely affect some wetlands and environmentally sensitive areas. However, It is possible to locate a route that minimizes these impacts.**	• **The MPC-North corridor has the highest potential for causing direct environmental impact since it represents a new corridor and is in close proximity to residential areas.** • **This corridor has greater impacts to community features in the Niagara Region than MPC "C" because of its close proximity to residential and institutional land uses in Welland, Fonthill and Niagara Falls.** • **There will be high impact to general agricultural lands since the majority of the peninsula is good quality agricultural lands.** • **A corridor across the peninsula can likely be located to minimize impacts to natural features because of the large separations between these features and the fact that they are predominantly oriented in and east-west direction.** • **The route around Hamilton has the potential to adversely affect some wetlands and environmentally sensitive areas. However, It is possible to locate a route that minimizes these impacts.**

7.2 Description of the Alternatives

7.2.1 QEW Widening to 8 Lanes

This alternative involves widening the QEW to 8 lanes from the Burlington Skyway Bridge to Highway 420 in Niagara Falls. The extent of work required to bring the QEW to 8-lanes is summarized below:

- The QEW from the Freeman Interchange (Highway 403) and the Burlington Skyway is 8 lanes, however some property will be required for interchange improvements.
- The QEW between the Burlington Skyway and Highway 406 in St. Catharines has been constructed to accommodate 8 lanes. The watercourse crossings have been sized accordingly.
- The QEW through St. Catharines to the Garden City Skyway will be 6 lanes (completion anticipated in 2006). Additional property will be required to add a lane in each direction.
- The QEW from the Garden City Skyway to Highway 420 is scheduled to be upgraded to 6 lanes with protection for 8 lanes. However, additional property will be required for interchange improvements.

As there is some additional property requirements to upgrade the QEW to 8 lanes there is some potential for adverse environmental effects. These effects are presented in Table 3.

7.2.2 Mid-Peninsula Corridor

The Mid-Peninsula Corridor would be a 4-lane controlled access highway constructed south of the Niagara Escarpment. At the Needs Assessment stage of transportation planning, broad corridors are investigated. The constraint mapping was used to identify possible route alternatives for a Mid-Peninsula Corridor. For the purposes of corridor identification, it is not necessary to conduct actual route or alignment level analysis unless there are critical areas where technical or environmental feasibility is in doubt.

The transportation analysis identified the need for a new transportation corridor connecting the QEW in the Region of Niagara to Highway 407 in the Region of Halton. As discussed in Section 4 of this report, such a route would pass through two areas that are highly constrained and required a more detailed investigation – the Highway 403-Highway 407 connection, and the Welland Canal Crossing. Therefore the corridor identification involved the following 3 sections which are discussed in this section of the report. These sections are:

1. Highway 403 to Highway 407;
2. Highway 403 to Welland; and
3. The Welland Canal Crossing.

7.2.2.1 Highway 403 to Highway 407

The overall constraint map (Figure 2) shows that the area south and west of Hamilton is rich with environmentally significant features including ANSI's, ESAs and wetlands. In addition, the Niagara Escarpment surrounds Hamilton, making an eventual crossing of the escarpment essential to providing a link to Highway 407. Finally, the area around Waterdown is highly developed.

The Study Team initially drove the roads in this area and later flew over the area to determine if there was any possible route for a new 100-metre wide right-of-way around Hamilton. The most critical constraint was the Niagara Escarpment. An opening in the escarpment northwest of Waterdown with a relatively gentle slope and few trees, was identified. The Study Team subsequently prepared a 1:5000 colour aerial mosaic of the area for the purposes of locating a possible route that could cross the escarpment at this location and avoid most of the other constraint areas (e.g. urban development, wetlands, ANSIs, and ESAs).

An initial route was laid out that avoided most of the sensitive areas and passed through the opening in the escarpment. The Study Team then refined the route to ensure that acceptable geometrics for a freeway could be achieved. The purpose of this analysis was to determine if it was environmentally and technically feasible to place a new highway around Hamilton. This analysis concluded that it was feasible to locate a 100-metre right-of-way in the Analysis Area. Figure 10 shows the Highway 403 to Highway 407 Analysis Area constraint map. An environmental assessment study would be required to eventually determine the final location of such a route.

7.2.2.2 Highway 403 to the Town of Welland

The key control points for a Mid-Peninsula Corridor, between Highway 403 south of Hamilton and the City of Welland, are set by local land use interests. Hamilton's Official Plan envisages growth in the vicinity of Hamilton International Airport. The Region of Niagara has a grow-south policy supporting a corridor through the middle of the Region. The proposed corridor, as shown on Figure 11, therefore passes south of the Hamilton International Airport and crosses the peninsula in the vicinity of Twenty Mile Creek.

The constraint mapping showed two possible corridors across the peninsula that avoids most of the environmentally significant areas. It is important not to place the corridor too far to the south since this would affect the extensive wetland complexes straddling Regional Roads 20 and 65. The Twenty Mile Creek Valley is another significant east-west feature. The Region of Niagara's Official Plan shows it as an environmentally sensitive area. The two possible corridors therefore run on either side of Twenty Mile Creek. In both areas, there are power lines, making a multi-use corridor possible for at least a portion of the length. The merits of these two corridors would be evaluated at the environmental assessment stage if and when a new route is proposed. For the purpose of this analysis a corridor south of Twenty Mile Creek was used because it is the more direct route between the south side of Hamilton International Airport and the City of Welland. It could follow the power transmission line corridors until it reaches Regional Road 24.

7.2.2.3 Welland Canal Crossing

The constraint mapping also showed that the area along the Welland Canal, between St. Catharines and Port Colborne, is highly constrained by urban development, tender fruit lands, the Niagara Escarpment, Short Hills Provincial Park, ESAs and wetlands. The constraint map showed two possible corridors across the Welland Canal. Figure 12 shows these two corridors and the environmental constraints.

The first corridor (MPC "C") passes south of Welland in the vicinity of the Townline Tunnel and runs parallel to Niagara Regional Road 25/Netherby Road and south of the railway corridor, connecting to the QEW in the vicinity of Netherby Road. The Study Team investigated this area in more detail to determine environmental and technical feasibility. The area was driven, flown and reviewed using aerial

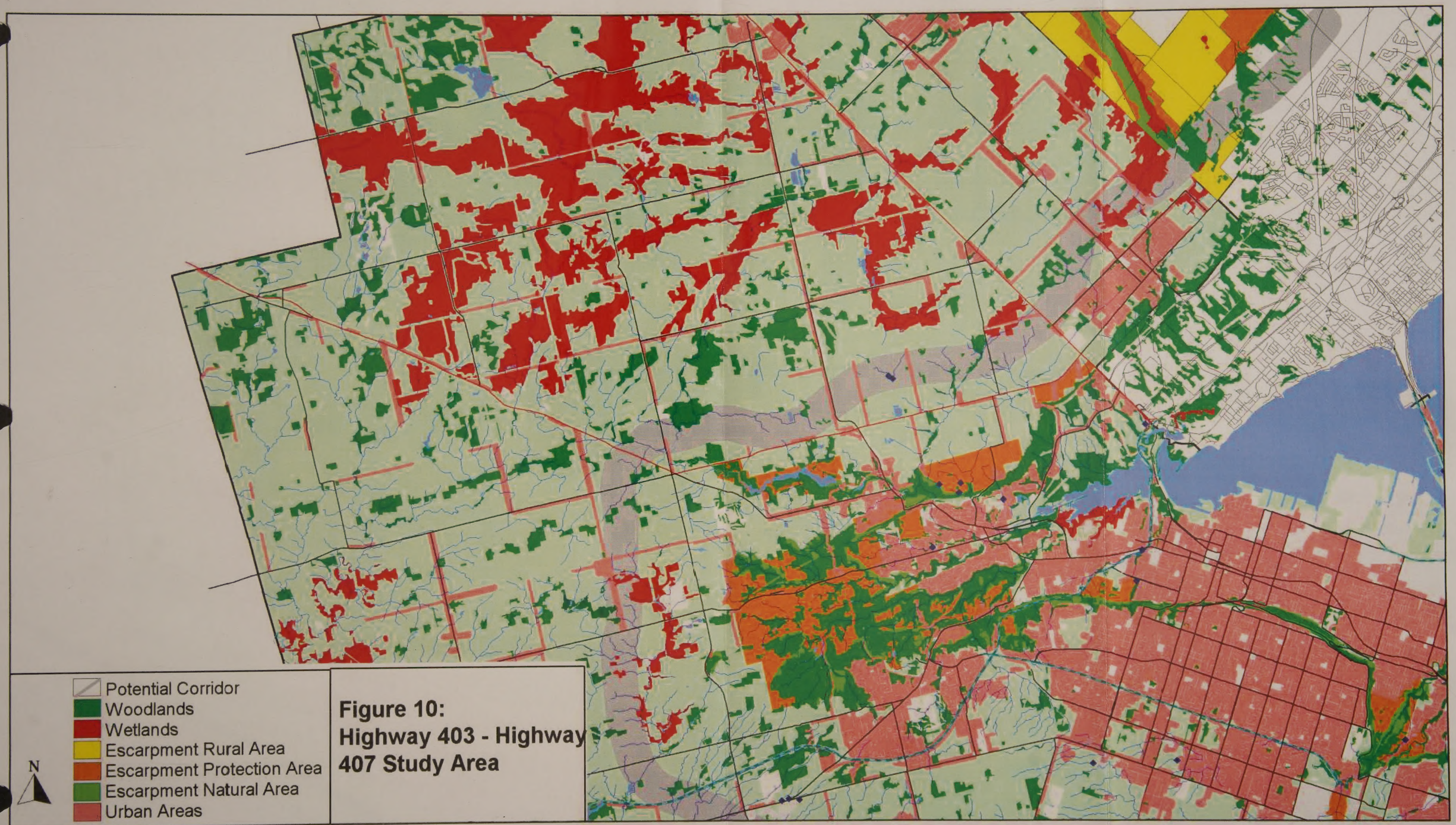


Figure 10:
Highway 403 - Highway 407 Study Area

Potential Corridor
Woodlands
Wetlands
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 11:
Highway 403 to Welland

Potential Corridor
Woodlands
Wetlands
Escarpment Rural Area
Escarpment Protection Area
Escarpment Natural Area
Urban Areas

N

Figure 12:
Welland Canal Crossing

photographs. More detailed secondary source information was also gathered to identify possible constraints associated with abandoned landfill sites in the area.

The second corridor (MPC "D2") passes through a narrow undeveloped gap between Welland and Fonthill, connecting to the QEW in the vicinity of Lyons Creek Road.

It was determined that there are no major environmental constraints that would prevent locating a route in either of these two corridors. The most significant environmental issue will be the crossing of the Welland River. The vegetative cover along the Welland River is sparse in areas, creating opportunities for crossings that would minimize the potential adverse effects on the features and functions of this corridor. The northern option (MPC "D2") has a greater potential for community impacts than does the southern option (MPC "C").

The MPC "C" alternative has the following environmental advantages:

1. The southern part of Welland is industrial land use and less sensitive to the community impacts of a freeway (noise and dust);
2. The east-west corridor between Townline Tunnel and the QEW in the vicinity of Netherby Road is less constrained then other east-west corridors to the north or south. However, there are woodlands, wetlands and ESAs in this area that will have to be taken into account during future EA Studies;
3. This is already a significant transportation corridor through the Townline Tunnel under the Welland Canal carrying both roadway and rail traffic;
4. A corridor to the west that does not have high environmental constraints can be identified.

There is a crossing of the Welland River ESA required. However, this crossing can likely be located and constructed with minimal impact to the ESA and the river. The corridor will also need to avoid the Welland Airport.

7.2.3 Environmental Evaluation

This section compares the three roadway alternatives on the basis of the environmental factor areas presented in Table 2 and the comparison presented in Table 3. Since the determination of a preferred alternative can only be done on the basis of more detailed analysis and public input, no conclusion is drawn regarding which alternative is best overall.

7.2.3.1 Groundwater

MPC "C" has the least potential to impact groundwater because it avoids areas of high susceptibility for groundwater contamination. The other two alternatives are similar in that they both cross areas of high susceptibility for groundwater contamination.

7.2.3.2 Surface Water

Transportation systems, by their linear nature, cannot avoid crossing watercourses. The QEW alternative has the least potential to impact surface water since there will be minimal additional work required at the existing watercourses.

Both MPC alternatives have approximately 100 watercourse crossings. Most will be minor crossings as they are tributaries to the main watercourses. The environmental implications of watercourse crossings can be minimized and mitigated during a route planning environmental assessment and therefore do not represent a major constraint to the siting of a new route across the peninsula. The tributaries to Twenty Mile Creek are angled such that the crossings associated with a corridor south of Twenty Mile Creek would likely be on a skew, increasing the cost and impact of these crossings. A corridor north of Twenty Mile Creek would have less crossings of this nature. Both MPC alternatives would also require a major crossing of the Welland River and a crossing of the Welland Canal. These two alternatives are ranked the same for surface water impacts.

7.2.3.3 Agricultural Lands

The QEW alternative has the greatest potential to impact the tender fruit lands if it is implemented on its own. Any option that does not include a mid-peninsula facility will place significant development pressure on the tender fruit lands below the escarpment. Both Mid-Peninsula Corridor alternatives will remove approximately 1300 ha of prime agriculture land from production. However, the two MPC alternatives have been rated better than the QEW option because of the reduction in impacts to tender fruit lands that comes with reducing development pressures north of the escarpment.

7.2.3.4 Wetlands

The QEW alternative has the lowest potential impacts to wetlands since the right-of-way for 8 lanes exists over much of the route and the impacts at the existing crossing are likely to be minimal.

The proposed Mid-Peninsula Corridor alternatives are located north of a large cluster of wetlands. MPC "C" has the potential for impacting approximately 160 ha of provincially significant wetlands, while MPC "D2" is slightly better, potentially affecting approximately 110 ha. The major wetland clusters south of Twenty Mile Creek are oriented in an east-west direction, allowing for the identification of a route that avoid these wetlands. A corridor to the north of Twenty Mile Creek has a lower potential to impact wetlands.

7.2.3.5 Parks

There are no National or Provincial Parks along the proposed Mid-Peninsula Corridor or the QEW. All alternatives rank the same with respect to this factor. There are three Conservation Areas near the MPC corridor and are common to both MPC alternatives. They are:

- E.C. Brown CA near the Welland River Crossing;
- Gainsborough CA on regional Road 20; and
- Binbrook Tract – north-east of the Village of Binbrook.

These Conservation Areas are small enough that they should be easily avoided during the Environmental Assessment and Preliminary Design stage.

7.2.3.6 Unique Spaces – Niagara Escarpment

Both Mid-Peninsula Corridor alternatives avoid the Escarpment Natural and Escarpment Protected areas throughout their length. They come close to the environmental protection lands where they cross the

escarpment north-east of Waterdown. Both MPC corridors pass through Niagara Escarpment Rural lands at this location where they traverse a gentle open slope down the escarpment. The 100 metre wide right-of-way will remove approximately 25 ha of Escarpment Rural designated lands. The impact to the environmentally sensitive aspects of the escarpment are not likely to be significant. However, because of this crossing of the escarpment, both MPC alternatives rank lower than the QEW alternative with respect to impacts to the escarpment.

7.2.3.7 Community Features

The QEW option has the potential for the highest community impacts due to the effects on St. Catharines. Both Mid-Peninsula Corridors cross rural lands for most of their length. MPC "C" passes south of Welland along the alignment of the Townline Tunnel. Since this part of the city is predominantly in industrial use it is compatible with a freeway and therefore ranks better than MPC "D2" which passes close to residential and institutional lands.

7.2.3.8 Areas of Natural and Scientific Interest (ANSI)

None of the three alternatives is likely to impact ANSIs. Both Mid-Peninsula alternatives pass near one Provincial Life Science/Earth Science ANSI – the Medad Valley near Waterdown. This area around Waterdown is highly constrained and a route will need to be carefully planned during a route-planning EA to minimize potential impacts to the Medad Valley ANSI. The corridors also pass to the north of several Regional Life Science ANSIs in the Region of Niagara. These ANSIs are associated with other natural features (e.g. wetlands) and can be avoided during route planning.

7.2.3.9 Environmentally Sensitive Areas (ESA)

The ESAs are associated with other features including the Niagara Escarpment, ANSIs, wetlands and river valleys. The QEW will have minimal effect on ESAs and therefore ranks the best. Both Mid-Peninsula Corridor alternatives cross the Welland River ESA, and must be routed around several ESAs between Highway 403 and Highway 407. In the area around Hamilton it is expected that the route will have some impact on ESAs because of the highly constrained nature of this corridor. One location where the corridor must cross an ESA is east of Cedar Springs Road / Brant Street in Burlington. The crossing could be at a narrow section of the ESA. However this would sever the ESA, having adverse effects on the corridor functions it provides. The QEW alternative is best with respect to potential impacts to ESAs because of the limited new property that would be required outside of urbanized areas.

7.2.3.10 Woodlands

Most of the large woodlands in the area are associated with the escarpment, river valleys, wetlands and ESAs. The other woodlands vary in size and are somewhat dispersed making it possible to avoid many of them during the route planning process. The low percentage coverage of woodlands in the Analysis Area means that small woodlands (>4 ha) are significant. The QEW alternative will likely affect some woodlands, however the impacts are likely to be less than with the Mid-Peninsula alternatives. It is likely that any new Mid-Peninsula Corridor will impact woodlands. MPC "C" will affect more woodland than the MPC "D2" however the difference is not significant because of the ability to avoid many of the smaller woodlands during route planning.

8.0 CONCLUSION

The environmental analysis was carried out using secondary sources, augmented by field reconnaissance and arial photography. One objective was to determine the environmental feasibility of a Mid-Peninsula Corridor. The assessment concluded that there would be environmental impacts associated with such a facility but that it is likely that a new Mid-Peninsula highway is environmentally feasible.

There are many possible route alternatives of a Mid-Peninsula highway. The identification and evaluation of these route alternatives would be done through the environmental assessment process. During the EA, more detailed environmental inventory work would be carried out and the evaluation and tradeoffs would be made with full public participation.

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NIAGARA PENINSULA TRANSPORTATION NEEDS ASSESSMENT STUDY

AIR QUALITY EMISSION INVENTORY

Project Number: 01-380A

Date: July 23, 2001

Submitted By: Rowan Williams Davies & Irwin Inc.

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Submitted to: Totten Sims Hubicki Associates
Ontario Ministry of Transportation

Companion Report: Energy Consumption and Carbon Dioxide Emissions

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TABLE OF CONTENTS

Page No.

1. INTRODUCTION 1

2. METHODOLOGY 2

2.1 Estimation of Emission Factors 2

2.1.1 Nitrogen Oxides and Carbon Monoxide 2
2.1.2 Inhalable Particulate Matter 5
2.1.3 Sulphur Dioxide 6

2.2 Development of Emission Inventories 7

3. RESULTS 8

4. DISCUSSION 10

5. CONCLUSIONS AND RECOMMENDATIONS 12

6. REFERENCES 14

APPENDIX

FIGURES

1. INTRODUCTION

Rowan, Williams, Davies and Irwin (RWDI) was retained by the Ontario Ministry of Transportation Ontario (MTO) through Totten Sims Hubicki (TSH) Associates to provide air emission inventories for a number of different transportation network scenarios in the Niagara Peninsula Transportation Corridor. Tailpipe and other vehicle related emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2), and inhalable particulate matter (PM_{10}) were considered in the inventory. Carbon dioxide (CO_2) emissions were also considered as part of the overall assessment, but have been reported under separate cover [1]. Emission inventories were developed for the following seven traffic scenarios. These scenarios were selected for use in the study by MTO.

- Base 2000: present traffic on existing road corridors;
- Base 2021: road systems unchanged from present;
- QEW 2021: QEW widened, mid-peninsula corridor (MPC) not built;
- MPC 2021: construction of MPC corridor, no alterations to QEW;
- Base 2031: road system unchanged from present;
- QEW 2031: QEW widened, MPC not built; and,
- MPC 2031: construction of MPC corridor, no alterations to QEW.

The traffic data used in this analysis was provided by TSH. These data were developed using EMME/2, a travel demand modelling package.

The total emissions over the peak P.M. hour were estimated for each of the above scenarios for each of the four contaminants for regional and provincial roadways. These emissions will be used by MTO to compare the relative difference in tailpipe and roadway emissions attributed to vehicular sources associated with each scenario. The analysis did not consider geographical locations, grade changes for each of the links, existing ambient air quality or local meteorological conditions.

2. METHODOLOGY

Factors that affect the emissions loadings include vehicle mixes, roadway lengths, traffic volumes for the various roadway options, vehicle speed, and roadway surface silt loadings (PM_{10} only). A discussion of the methodology is provided in this section in addition to the assumptions applied in the analysis.

2.1 Estimation of Emission Factors

2.1.1 Nitrogen Oxides and Carbon Monoxide

Emission factors for NO_x and CO were calculated using Environment Canada's MOBILE5C model. This model allows the user to determine the emission rates for defined classes of on-road motor vehicles under a variety of environmental, fleet mix, and operating conditions [2]. MOBILE5C is a modified version of the U.S. EPA's model MOBILE5, adjusted for the differences in the Canadian vehicle fleet.

Vehicle registration distributions for Ontario are provided in the MOBILE5C user's manual [2]. The default parameters in MOBILE5C were applied in the modelling. The emissions modelling did not account for the MOE's Drive Clean Program and other more recent policy initiatives.

Environment Canada recently announced that a Memorandum of Understanding (MOU) has been signed with the Canadian Vehicle Manufacturers' Association and the Association of International Automobile Manufacturers of Canada. These associations have committed to marketing low-emission vehicles for model years 2001 to 2003. Environment Canada also intends to release draft regulations to phase-in further emission reductions beginning with the 2004 model year [3]. These initiatives are expected to reduce the projected emission rates.

MOBILE5C provides emission factors up to the year 2020. The results for 2020 were applied to the 2021 and 2031 scenarios considered in this assessment. It is expected that vehicle

technology will improve and emission regulations will become increasingly more stringent. Therefore, predicted emissions for 2031 are likely over-estimated.

Table 1 presents a summary of the inputs used with the MOBILE5C model. The traffic speeds used for each link were provided by TSH.

Table 1: MOBILE5C Model Input Parameters

Input Information	Value
Ambient Temperature	-7.2 °C (average minimum winter temperature)
Average Congested Vehicle Speed	Varied for each link (provided by TSH)
Province	Ontario
Operating Years	2000 and 2020
Vehicle Operating Mode	Default cold-start fraction
Default Vehicle Mixes	2000 Light Duty Gas Vehicles (LDGV): 61.2% Light Duty Gas Trucks (LDGT): 28.8% Heavy Duty Gas Vehicles (HDGV): 2.9% Light Duty Diesel Vehicles (LDDV): 0.1% Light Duty Diesel Trucks (LDDT): 0.1% Heavy Duty Diesel Vehicles (HDDV): 6.3% Motorcycles (MC): 0.6% 2020 Light Duty Gas Vehicles (LDGV): 57.0% Light Duty Gas Trucks (LDGT): 30.9% Heavy Duty Gas Vehicles (HDGV): 3.1% Light Duty Diesel Vehicles (LDDV): 0.2% Light Duty Diesel Trucks (LDDT): 0.6% Heavy Duty Diesel Vehicles (HDDV): 7.8% Motorcycles (MC): 0.4%

A description of each of the vehicle mix categories presented in Table 1 is defined in Table 2. For ease in estimating vehicle mix categories, the Light Duty Gas Trucks-I (LDGTI) and Light Duty Gas Trucks-II (LDGTII) categories were combined.

Table 2: Summary of the Vehicle Classification System

Vehicle Class	Description
Light Duty Gas Vehicles (LDGV)	Any gasoline fueled vehicle designated primarily for transportation of persons (e.g., cars)
Light Duty Gas Trucks I (LDGTI)	Gross vehicle weight rating of 6,000 lbs or less. Although LDGTs have a load carrying capacity that exceeds that of passenger cars, they are often used for personal transportation and light hauling (e.g., minivans, pickup trucks, sport utilities)
Light Duty Gas Trucks II (LDGTII)	Gross vehicle weight rating between 6,001 and 8,500 lbs (e.g., large cube vans)
Heavy Duty Gas Vehicles (HDGV)	Any gasoline-fueled motor vehicle designated primarily for the transportation of property and rated at more than 8,500 lbs, or designated for transportation of persons and having a capacity of more than 12 persons (e.g., school buses)
Light Duty Diesel Trucks (LDDT)	Diesel powered motor vehicle designed primarily for transportation of property and rated at 8,500 lbs or less (e.g., large cube van, 4 x 4)
Light Duty Diesel Vehicle (LDDV)	Any diesel powered automobile designated primarily for the transportation of persons (e.g., car)
Heavy Duty Diesel Vehicles (HDDV)	Any diesel vehicle designated primarily for the transportation of property and rated at more than 8,500 lbs (e.g., tractor trailers, commercial bus)
Motorcycles (MC)	Any motor vehicle designated to travel with no more than 3 wheels in contact with the ground and with a curb weight of less than 1,500 lbs

Source: Reference 2

A vehicle mix was provided by TSH for each link in terms of automobile-tourist, automobile-local and trucks. Automobiles were set equal to LDGVs, LDGTs, LDDTs, LDDVs and MCs according to the relative proportions provided in Table 1. Trucks were set equal to HDGV and HDDV also according to the relative proportions provided in Table 1.

Emission factors for CO and NO_x for a range of vehicle speeds are presented in Table 3. These values were averaged over the fleet of vehicles and also include a vehicle mix that varies by age as specified in MOBILE5C. The emission factors were generated for a range of congested speeds and the resulting emission factors were applied, based on the congested speed for each link, which was provided by TSH.

Table 3: CO and NO_x Emission Factors

Pollutant	Year	Vehicle Emission Rates (g/veh/km)							
		20 km/h		40 km/h		60 km/h		100 km/h	
		Cars	Trucks	Cars	Trucks	Cars	Trucks	Cars	Trucks
CO	2000	27.2	15.3	16.2	7.6	9.6	5.3	10.9	6.3
	2020	28.8	27.6	17.0	14	10.7	9.5	14.0	12
NO_x	2000	1.1	6.5	1.1	5.3	1.1	5.2	1.7	8.4
	2020	1.1	4.2	1.0	3.4	1.1	3.4	1.6	5.5

The relationship between emission factors and vehicle speed is shown in Figures 1 and 2 for NO_x and CO, respectively. The data presented in these charts are based on the year 2000 and the default vehicle mix contained within MOBILE5C (see Table 1).

2.1.2 Inhalable Particulate Matter

Initially the U.S. EPA's PART5 was run to determine the contribution of tailpipe exhaust emissions relative to fugitive dust emissions from the roadway surface [4]. The results showed that exhaust emissions are negligible in comparison to roadway emissions and thus were not included in this assessment.

Roadway emissions of PM_{10} were calculated based on the following equation from the U.S. EPA's AP-42 emission factors for paved roads [5].

$$E=k(sL/2)^{0.65}(W/3)^{1.5}$$

where: E = particulate emission factor (g/vmt);

k = base emission factor for particle size range; for PM_{10}, k= 7.3/vmt;

sL = silt loading value (g/m^2), which is dependent on a number of factors including traffic volume. A value of 0.3 g/m^2 was applied for high average daily traffic (ADT) roads (i.e., greater than 5,000 vehicle movements per day) and 1 g/m^2 was applied for

low ADT roads (i.e., less than 5,000 vehicle movements per day). These silt loading values represent the median values of the ranges provided in AP-42. ADT designations were calculated based on data provided by TSH; and

W = average vehicle weight of the vehicles traveling the road (tons). This value was adjusted on a link-by-link basis, based on the vehicle mix provided by TSH.

Table 4 summarizes a sample of emission factor results for PM_{10}.

Table 4: PM_{10} Emission Factors

Roadway Link	Roadway Surface Emission Rates (g/veh/km)	
	All Speeds	
	Cars	Trucks
High ADT Links	1.4	8.4
Low ADT Links	3.2	19

2.1.3 Sulphur Dioxide

Emission factors for SO_2 were calculated using the U.S. EPA's PART5 model [4]. Default model input parameters were applied. Similar to the approach outlined above for CO and NO_x, the vehicle mix data were re-adjusted to be consistent with the data from TSH. Vehicle emission rates from PART5 for a range of vehicle speeds are provided in Table 5.

Table 5: SO_2 Emission Factors

Year	Vehicle Emission Rates (g/veh/km)							
	20 km/h		40 km/h		60 km/h		100 km/h	
	Cars	Trucks	Cars	Trucks	Cars	Trucks	Cars	Trucks
2000	0.06	0.22	0.05	0.22	0.06	0.22	0.06	0.22
2020	0.06	0.20	0.05	0.20	0.06	0.20	0.06	0.20

The relationship between emission factors and vehicle speed is shown in Figure 3 for SO_2. The data presented in this chart are based on the year 2000 and the default vehicle mix contained within PART5. As illustrated, SO_2 emission rates are not sensitive to vehicle speeds.

Emission estimates from PART5 are expected to be over-estimated because the model does not account for recent limits on sulphur content in gasoline and diesel set within the Canadian Environmental Protection Act. The current sulphur limit in gasoline is 0.05% and is expected to decrease to 0.015% in 2002 and 0.003% in 2005. The average sulphur content in diesel fuel is currently 0.033%. A sulphur limit in diesel of 0.0015% is proposed for implementation in 2006 [3]. These reductions in the sulphur content of gasoline and diesel fuel are expected to cause proportional decreases in sulphur emissions.

2.2 Development of Emission Inventories

Emission inventories were developed for each of the scenarios for NO_x, CO, SO_2, and PM_{10}. TSH provided RWDI with the scenarios which included link length, number of lanes, peak PM traffic volumes, average congested traffic speeds and vehicle mix (Automobile-Tourist, Automobile-Local and Truck). Emission factors were calculated for each link based on the congested speed where emissions were dependent on speed (i.e., CO and NO_x), the vehicle mix and the total traffic volumes. Emission rates were subsequently calculated for each link based on the total volume. These emission rates for the various links were summed according to their categorization (i.e., Niagara Regional, Burlington Regional, Hamilton Regional or Provincial).

In addition to predicting contaminant emissions for each scenario, calculations of total roadway length, total vehicle-kilometers travelled (VKT) and average congested speed (weighted based on length of link) were conducted for each of the categories of interest.

3. RESULTS

The results for all seven scenarios are summarized in Tables 6 to 12. Figures 4 through 11 show total PM peak traffic emissions by contaminant for each scenario, category and the relative contributions of autos and trucks to total emissions from the regional roads and provincial roads.

Table 6: Base 2000 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions by Pollutant (tonnes)			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,628	2,380,849	70.8	35.6	3.1	4.9	0.1
Provincial Total	817	1,044,005	73.3	13.2	1.6	2	0
Niagara Regional	2,023	532,311	72.5	9	0.6	1.4	0
Hamilton Regional	1,418	588,270	69.9	9.3	0.6	1.2	0
Burlington Regional	370	216,263	54.9	4.2	0.2	0.4	0
Regional Total	3,811	1,336,844	69.8	22.4	1.5	2.9	0

Table 7: Base 2021 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions by Pollutant (tonnes)			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,722	3,427,273	64.6	56.1	4	6.8	0.2
Provincial Total	826	1,661,152	67.1	22.9	2.1	3.1	0.1
Niagara Regional	1,995	708,613	65.9	13.1	0.8	1.7	0
Hamilton Regional	1,510	766,054	64.4	13.3	0.8	1.6	0
Burlington Regional	391	291,454	48.1	6.8	0.3	0.5	0
Regional Total	3,896	1,766,122	63.5	33.1	1.9	3.7	0.1

Table 8: MPC 2021 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions by Pollutant (tonnes)			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,990	3522,193	68.7	50.2	4.1	7	0.2
Provincial Total	1,053	1,875,474	72	20.4	2.3	3.5	0.1
Niagara Regional	2,072	699,219	68.7	12.3	0.7	1.7	0
Hamilton Regional	1,478	673,076	66.7	11.2	0.7	1.4	0
Burlington Regional	388	673,076	49.9	6.2	0.3	0.5	0
Regional Total	3,937	1,646,719	66.1	29.8	1.7	3.5	0

Table 9: QEW 2021 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions by Pollutant (tonnes)			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,646	4,116,813	66.9	51.7	3.9	6.8	0.2
Provincial Total	825	1,413,858	70.3	21.1	2.1	3.2	0.1
Niagara Regional	1,940	1,206,079	69.4	11.3	0.7	1.6	0
Hamilton Regional	1,490	1,094,917	65.4	12.6	0.8	1.5	0
Burlington Regional	391	401,958	48.1	6.7	0.3	0.5	0
Regional Total	3,822	2,702,955	65.7	30.6	1.8	3.6	0

Table 10: Base 2031 Results

Roads	Total Roadway Length (km)	Vehicle KilometersTravelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions by Pollutant (tonnes)			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,754	4,384,360	62.8	61	4.2	7.2	0.2
Provincial Total	831	1,399,914	64.9	24.2	2.1	3.3	0.1
Niagara Regional	2,012	1,370,293	63.9	14.5	0.8	1.8	0
Hamilton Regional	1,520	1,185,182	63.1	14.7	0.9	1.7	0
Burlington Regional	392	428,971	46.5	7.6	0.3	0.5	0
Regional Total	3,924	2,984,446	61.8	36.8	2.1	4	0.1

Table 11: MPC 2031 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions by Pollutant (tonnes)			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,889	4,172,232	67.4	54.7	4.3	7.3	0.2
Provincial Total	1,054	1,378,128	70.7	22.4	2.5	3.7	0.1
Niagara Regional	1,961	1,294,952	67.3	12.8	0.7	1.6	0
Hamilton Regional	1,485	1,089,167	65.8	12.3	0.8	1.5	0
Burlington Regional	389	409,985	48.1	7.2	0.3	0.5	0
Regional Total	3,835	2,794,104	64.8	32.3	1.8	3.6	0.1

Table 12: QEW 2031 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour Emissions (tonnes) by Pollutant			
				CO	NO_x	PM_{10}	SO_2
Total (all)	4,676	4,322,301	65.3	57.5	4.1	7.2	0.2
Provincial Total	826	1,456,773	68.5	23.1	2.2	3.4	0.1
Niagara Regional	1,966	1,276,108	67.5	12.4	0.7	1.7	0
Hamilton Regional	1,493	1,157,446	64.4	14.1	0.9	1.6	0
Burlington Regional	392	431,974	46.3	7.9	0.3	0.5	0
Regional Total	3,851	2,865,528	64.2	34.4	1.9	3.8	0.1

4. DISCUSSION

The scenarios provided to RWDI by TSH were in the form of spreadsheets containing quantitative information such as link length, volumes, vehicle mix and vehicle speed information. Appendix A contains an example of a spreadsheet. The following discussion is limited to general trends in total emissions and does not attempt to analyse the results based on details of the scenarios.

The CO results (Figure 4) show that for 2021 and 2031, the "MPC" scenarios result in the lowest predicted emissions, followed by the "QEW" scenarios, when compared to the emissions

predicted for the "Base" scenarios. The relative contribution from each of the regional and provincial categories to total emissions do not change significantly between scenarios. CO emission factors are expected to decrease over time, and the current models do not account for this; therefore, the emissions calculated for the 2021 scenario are likely over-estimated relative to the 2000 scenario. As well, decreases in emissions are expected for 2031 relative to 2021, however as discussed, MOBILE5C cannot provide estimates beyond 2020. Therefore, it is expected that the emission rates for 2031 are also over-estimated. Increases in total emissions shown are likely as a result of increased projected traffic volumes only.

Figure 5 shows that trucks on regional and provincial roads make a very small contribution to total CO emissions, and were calculated to be approximately 2% for all of the future scenarios and 3% for the "Base 2000" scenario.

The results for NO_x, provided in Figure 6 indicate slightly lower emissions for the "QEW" scenarios for both 2021 and 2031 compared to the "Base" and the "MPC" scenarios, with the "MPC" scenarios predicted to have the highest emissions in both 2021 and 2031 cases. As discussed in Section 2.1.1, NO_x emission factors are expected to decrease in the future and would be less than that shown in Figure 6 for years 2021 and 2031, although the decrease in emission factors for 2021 relative to 2000 would remain somewhat off-set by factors such as the increase in traffic volumes. The emissions for 2031 are over-estimated since MOBILE5C does not predict emission factors beyond 2020. Although it is felt that the total tailpipe emissions calculated for each of the future scenarios are over- estimated, the relative comparison between scenarios within a given year is not expected to change with updates to emission factor models.

Trucks account for between approximately12.% (Base 2021) to 15% (Base 2031) of total NO_x emissions (Figure 7).

The PM_{10} results (Figure 8) show that emissions for the "Base" and "QEW" scenarios are expected to be comparable within each given year and are only marginally less than emissions from the "MPC" scenario. Unlike the other contaminants, PM_{10} emissions from the roadway surfaces are generally not dependent on improved vehicle technologies or more stringent regulations for gasoline.

Therefore, it is expected that the relative comparison of emissions between scenario years will remain unchanged unless road maintenance practices such as sweeping are improved.

Trucks account for between approximately 19% ("Base" 2000) to 34% ("Base" 2021) of total PM_{10} emissions (Figure 9). It should be noted that the PM_{10} emissions in Figure 8 were calculated based on the average vehicle weight of the entire fleet; whereas, the emissions in Figure 9 for autos and trucks were calculated based on the individual vehicle weights and sum of the emission factors. Therefore, there are slight differences between the totals presented in Figures 8 and 9 for each scenario.

The SO_2 emissions (Figure 10) show that for 2021 and 2031, the "QEW" scenario results in marginally lower emissions than the "Base", and "MPC" scenarios, and the "MPC" scenarios were predicted to have the highest emissions. It is expected that the calculated SO_2 emissions for 2021 and 2031 are over-estimated since PART5 does not account for the increasingly stringent limits on sulphur content in gasoline.

Trucks account for between approximately 8% (Base 2000) to 18% (2031 "QEW" Scenario) of total SO_2 emissions (Figure 11).

5. CONCLUSIONS AND RECOMMENDATIONS

For several contaminants considered in the analysis (NO_x and SO_2), the "QEW" scenario resulted in lower emissions in comparison to the other scenarios for both 2021 and 2031. PM_{10} emissions from roadway surfaces did not change considerably between scenarios, but were marginally better for the "QEW" and "Base"scenarios compared to the "MPC" scenario. CO emissions were lowest for the "MPC" scenario for both 2021 and 2031.

Relative to total emissions, truck traffic was calculated to account for only a small fraction of total CO emissions, i.e., between 2% and 3% for all scenarios. For NO_x and SO_2, truck traffic accounted for approximately 8% to 18% of total emissions. Truck traffic makes the largest

contribution to roadway PM_{10} emissions, accounting for approximately 19% to 34% of total emissions for all scenarios considered.

The emission models used to estimate emission factors for each of the exhaust contaminants do not reflect future vehicular technologies or regulations, and thus total emissions calculated for future scenarios are likely overestimated. However, the relative comparison between scenarios within a given year is not expected to change with updates to emission factor models. If these results are intended to be used for more than a comparative analysis, it is recommended that the results be updated using MOBILE6 once it becomes available to the public. As well, it may be worthwhile to undertake a similar analysis to consider non-peak traffic conditions or average daily movements.

6. REFERENCES

1. Rowan Williams Davies & Irwin Inc. *Niagara Peninsula Transportation Needs Assessment Study - Energy Consumption and Carbon Dioxide Emissions.* RWDI Report # 01-380B, July 23, 2001.

2. Environment Canada. *MOBILE5C User Guide*. Transportation Systems Division, Industrial Pollution Prevention. September 1993.

3. Environment Canada News Releases. www.ec.gc.ca/press/2001/010611_n_e.htm. June 11, 2001.

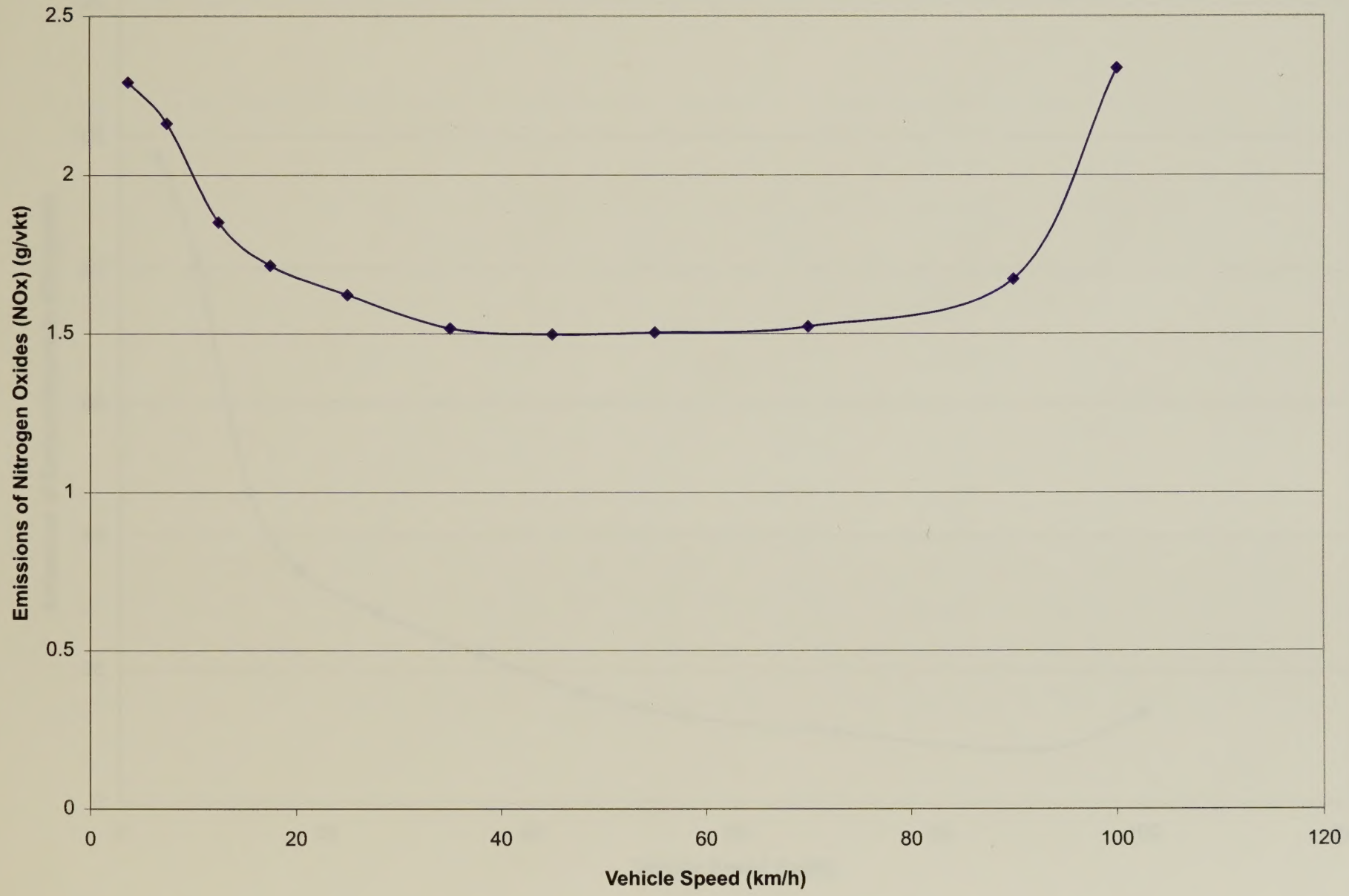
4. United States Environmental Protection Agency. *Draft User's Guide to PART5: A Program For Calculating Particle Emissions from Motor Vehicles*. Office of Mobile Sources. Ann Arbor, MI. February 1995.

5. United States Environmental Protection Agency. *Compilation of Emission Factors (AP-42), Volume I, Stationary Point and Area Sources.* Chapter 13 Section 13.2.1. October 1997.

APPENDIX A

MTO - Niagara Needs Assessment
Link Assessment Information
Year 2000 - P.M. Peak Hour Volumes

Region	Facility Type	Link Information Link Code	Coordinate - Node i, Node j Xi	Yi	Xj	Yj	# of Lanes	Length (km)	Capacity (vpl)	Posted Speed (km/h)	Congested Speed (km/h)	Assigned Volume Auto	Auto - Tourists	Trucks	Total Volume	V/C	LOS	LOS Based Speed (km/h)
Niagara	MTO	11	640607	781850	640840	781870	1	0.15	1200	60	28	977	178	131	1286	1.07	F	15
		11	623750	782600	624280	782700	1	0.54	1200	60	39	1020	259	0	1279	1.07	F	15
		11	641060	782000	640620	781980	2	0.44	2400	90	66	1493	720	187	2400	1.00	F	22.5
		11	640620	781980	639990	781730	2	0.68	2400	90	39	2184	715	187	3086	1.29	F	22.5
		11	639990	781730	639448	781741	2	0.57	2400	90	62	1592	714	187	2492	1.04	F	22.5
		11	642200	781720	643320	781450	2	1.15	2400	90	66	1467	742	197	2406	1.00	F	22.5
		11	644620	776780	644360	776310	2	0.54	2400	90	40	2405	2	67	2474	1.03	F	22.5
		11	639720	781700	640000	781700	2	0.28	2400	90	39	2167	723	197	3087	1.29	F	22.5
		11	640000	781700	640607	781850	2	0.66	2400	90	39	2167	723	197	3087	1.29	F	22.5
		11	638380	781850	638050	781880	2	0.33	2400	90	55	1580	538	284	2403	1.00	F	22.5
		11	638731	781679	639720	781700	2	0.98	2400	90	64	1516	716	197	2430	1.01	F	22.5
		11	638040	781840	638731	781679	2	0.74	2400	90	42	1865	716	303	2885	1.20	F	22.5
		11	623280	782700	624280	782700	2	1	2400	90	49	1676	454	303	2434	1.01	F	22.5
		11	636940	781940	638040	781840	2	1.1	2400	90	49	1694	713	303	2710	1.13	F	22.5
		11	641980	781790	641060	782000	2	0.94	2400	90	66	1493	720	187	2400	1.00	F	22.5
		11	640850	767710	640050	767280	1	0.91	800	70	44	702	50	0	752	0.94	E	35
		11	644760	781000	644897	780964	1	0.15	1200	70	40	1097	27	12	1136	0.95	E	35
		11	643300	779700	643080	779790	1	0.24	1200	50	34	1002	0	0	1002	0.83	D	40
		11	641700	768220	640850	767710	1	0.99	800	80	50	702	50	0	752	0.94	E	40
		11	642480	768750	641700	768220	1	0.94	800	80	50	702	50	0	752	0.94	E	40
		11	618060	772710	618170	772510	1	0.23	800	50	32	688	0	0	688	0.86	D	40
		11	644600	777840	644660	777240	2	0.6	2400	90	48	2191	0	67	2258	0.94	E	45
		11	643620	779440	644080	779160	2	0.54	2400	90	48	2191	0	67	2258	0.94	E	45
		11	651110	778390	651620	777740	2	0.83	2400	90	59	1769	319	133	2220	0.93	E	45
		11	638050	781880	636960	781980	2	1.09	2400	90	59	1485	538	284	2307	0.96	E	45
		11	624280	782720	623280	782740	2	1	2400	90	54	1602	513	284	2400	1.00	E	45
		11	650190	779190	651110	778390	2	1.22	2400	90	59	1769	319	133	2220	0.93	E	45
		11	653060	773880	652960	774980	2	1.1	2400	90	61	1695	435	143	2273	0.95	E	45
		11	644080	779160	644600	777840	2	1.42	2400	90	48	2191	0	67	2258	0.94	E	45
		11	640050	767280	639640	767060	1	0.47	900	60	44	702	50	0	752	0.84	D	48
		11	637400	782130	636960	781980	1	0.46	1200	60	50	796	175	0	972	0.81	D	48
		11	617220	783480	617480	783420	1	0.27	1200	60	43	948	38	0	985	0.82	D	48
		11	639990	781730	640010	781950	1	0.22	1200	50	47	592	1	0	594	0.49	A	50
		11	643870	775680	643940	775620	1	0.09	1200	50	50	0	0	0	0	0.00	A	50
		11	643690	775360	643580	775420	1	0.13	1200	50	50	0	0	0	0	0.00	A	50
		11	657360	772320	657554	772497	2	0.06	2400	50	50	89	556	23	667	0.28	A	50
		11	641640	750730	641380	750460	1	0.37	800	50	50	153	9	0	162	0.20	A	50
		11	641640	750730	642020	750820	2	0.39	1000	50	50	216	2	0	218	0.22	A	50
		11	644120	751120	643660	751150	2	0.46	1600	50	50	401	14	0	414	0.26	A	50



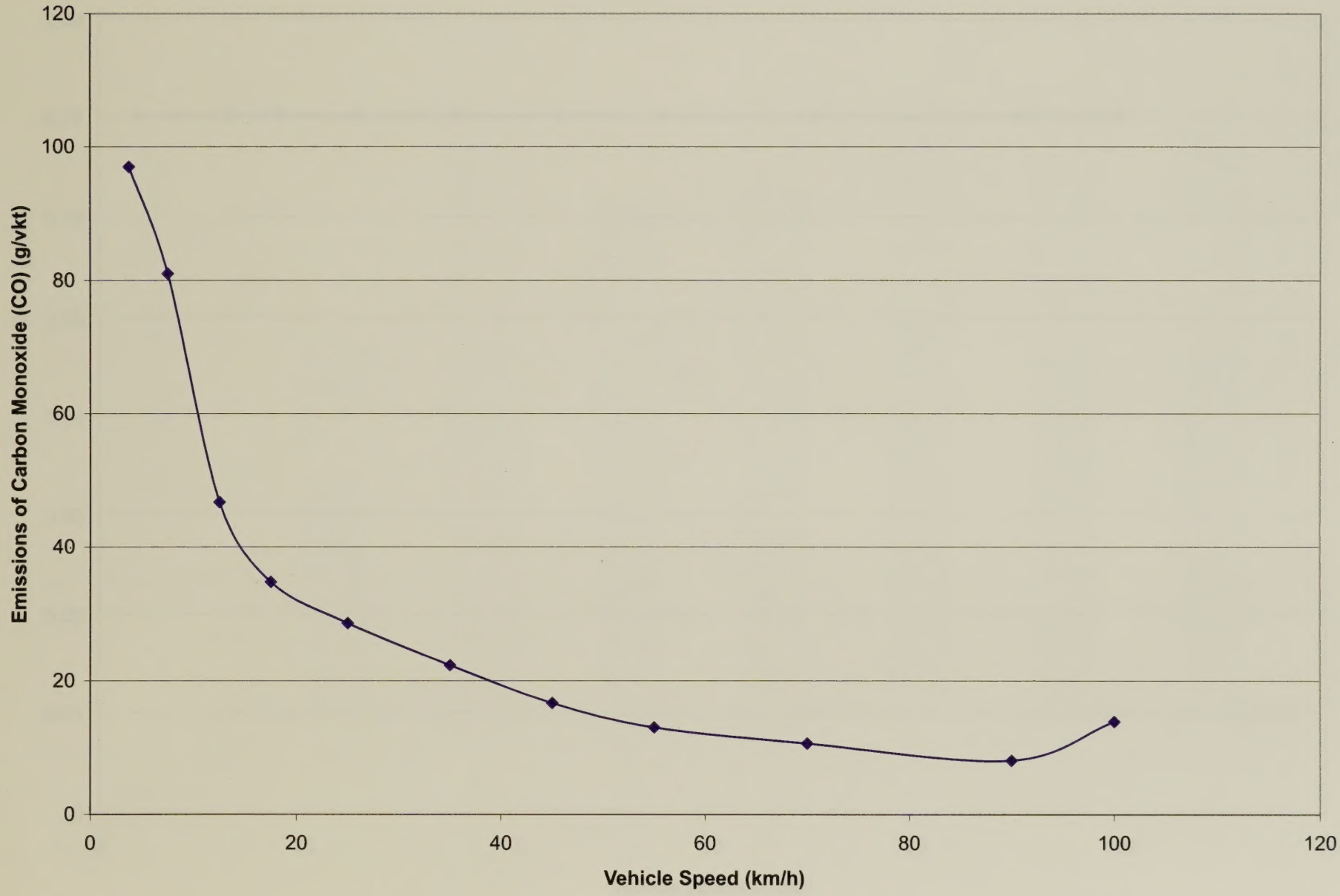
Effects of Speed on Emissions of Nitrogen Oxides (NO_x)

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

Drawn by: SWJ	Figure: 1
Scale:	NTS
Date Revised:	June 29, 2001

RWDI



Effects of Speed on Emissions of Carbon Monoxide (CO)

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

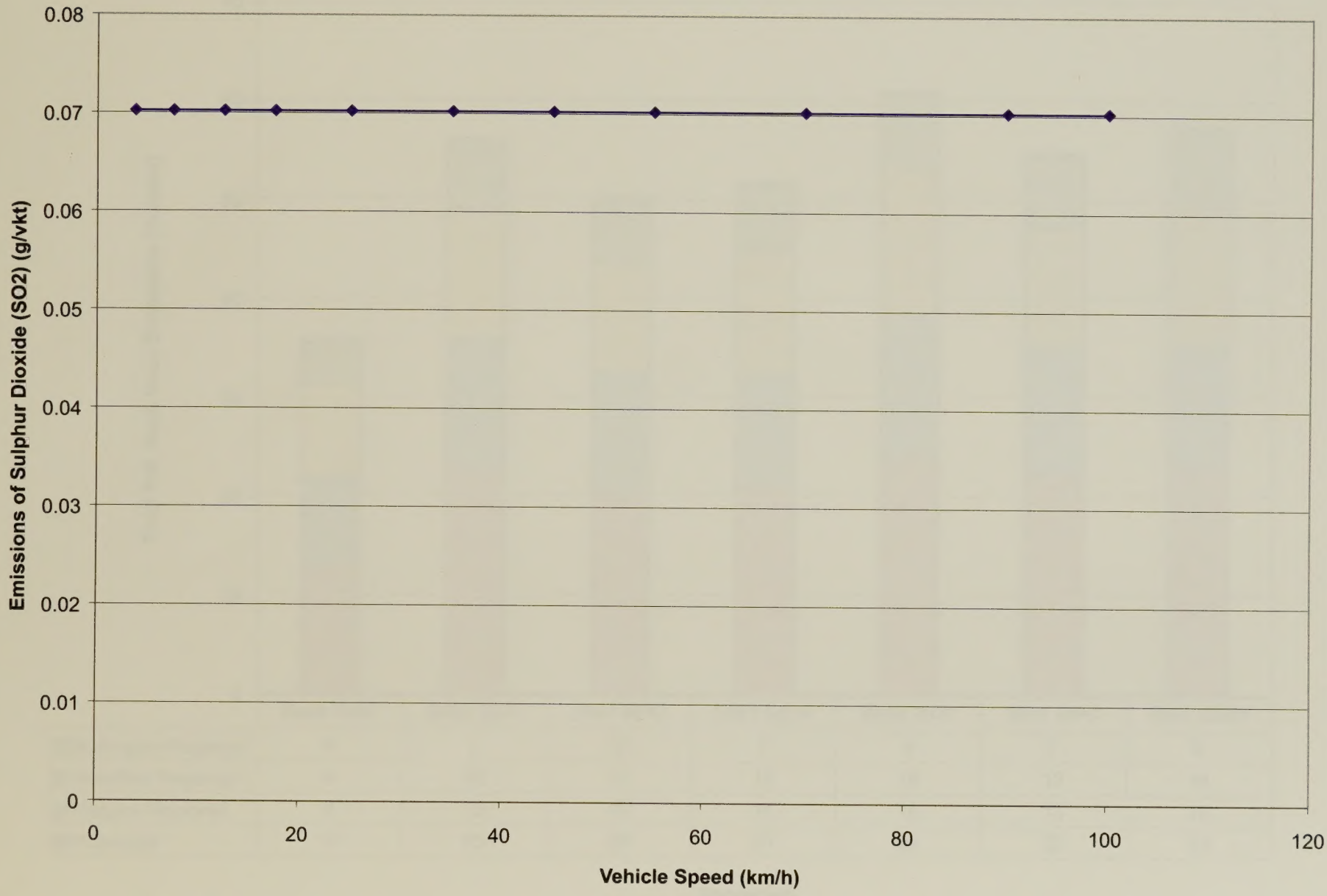
Project #01-380

Drawn by: SWJ | Figure: 2

Scale: NTS

Date Revised: June 29, 2001

RWDI



Effects of Speed on Emissions of Sulphur Dioxide (SO_2)

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

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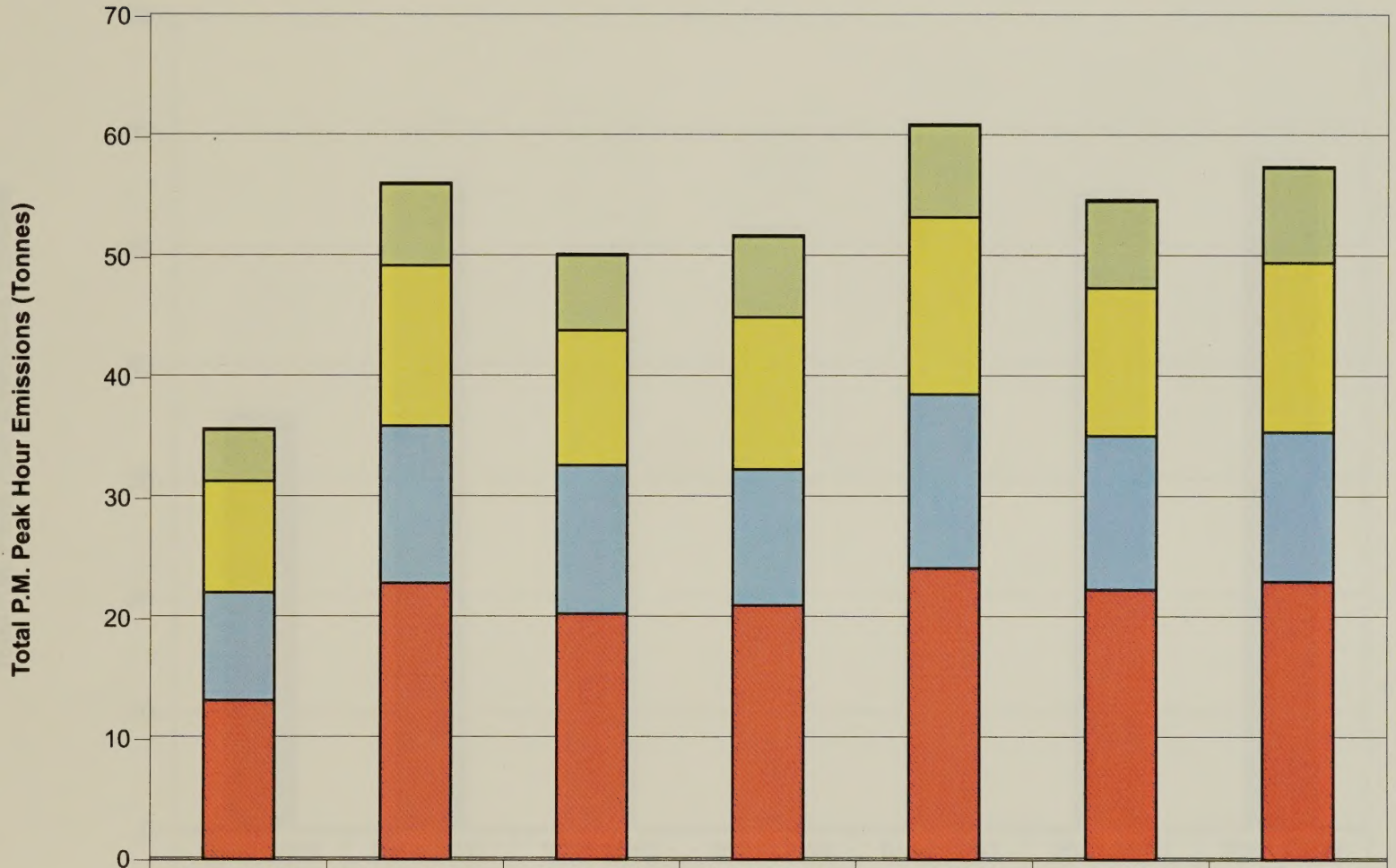
Scale: NTS

Date Revised: June 29, 2001

RWDI



	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Burlington Regional	4	7	6	7	8	7	8
Hamilton Regional	9	13	11	13	15	12	14
Niagara Regional	9	13	12	11	14	13	12
Provincial	13	23	20	21	24	22	23

Scenarios

Carbon Monoxide (CO) Emissions

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

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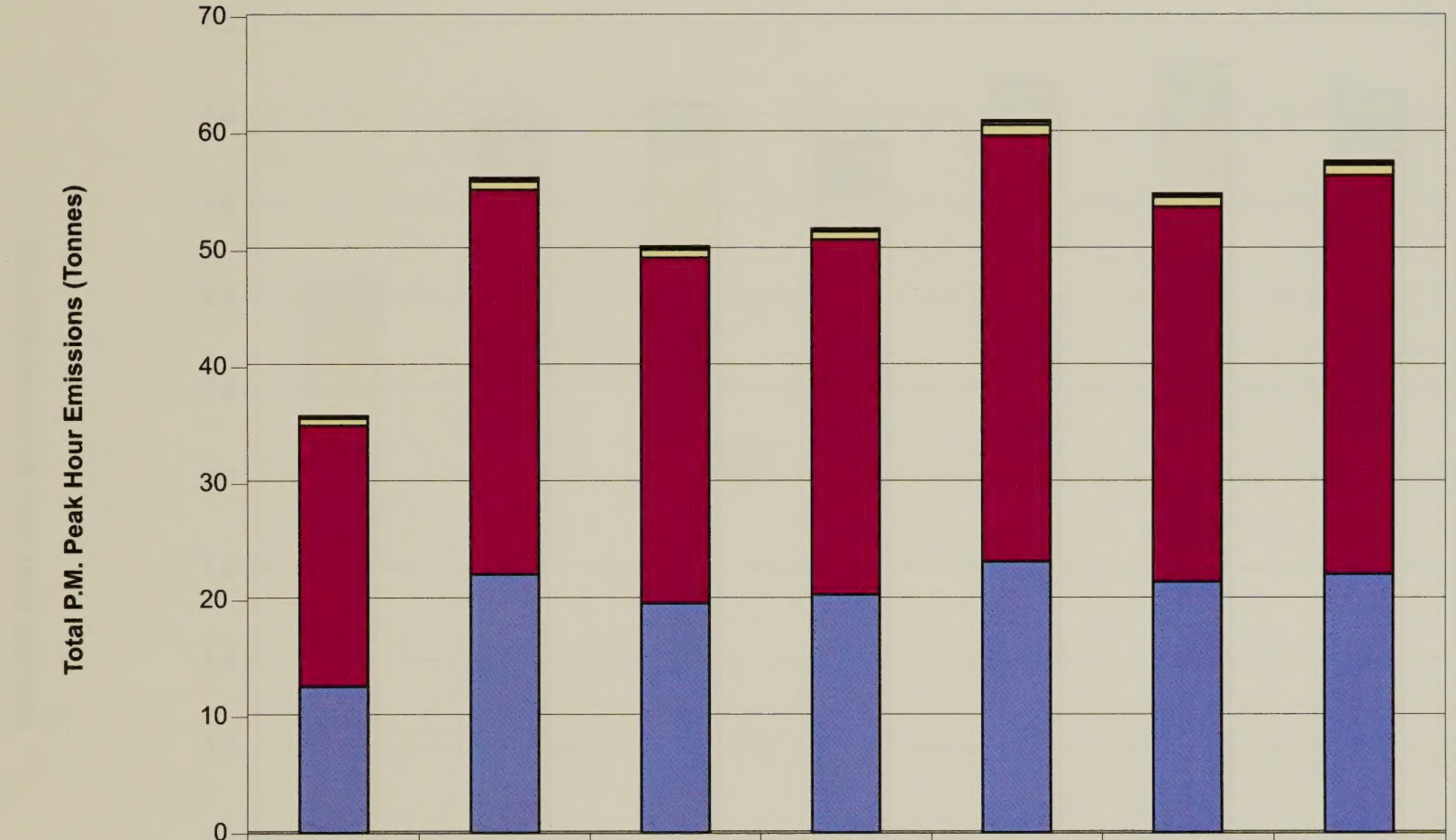
Scale: NTS

Date Revised: July 18, 2001

RWDI



	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Trucks Regional	0.09	0.19	0.14	0.16	0.26	0.17	0.22
Trucks Provincial	1	1	1	1	1	1	1
Autos Regional	22	33	30	30	37	32	34
Autos Provincial	13	22	20	20	23	22	22

Scenarios

Carbon Monoxide (CO) Emissions - Autos & Trucks

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

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Scale: NTS

Date Revised: July 18, 2001

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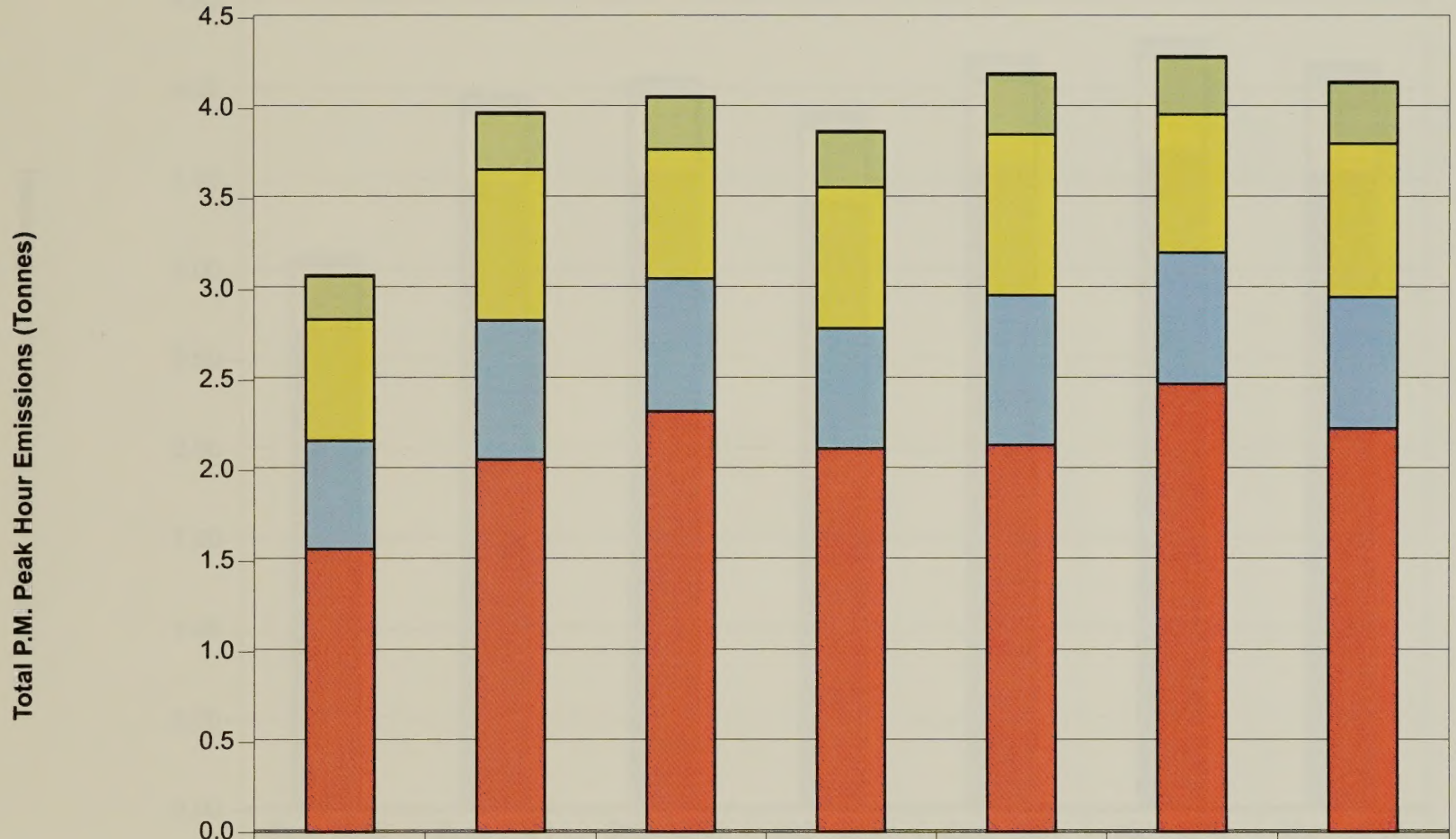

	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Burlington Regional	0.2	0.3	0.3	0.3	0.3	0.3	0.3
Hamilton Regional	0.7	0.8	0.7	0.8	0.9	0.8	0.8
Niagara Regional	0.6	0.8	0.7	0.7	0.8	0.7	0.7
Provincial	1.6	2.1	2.3	2.1	2.1	2.5	2.2

Scenarios

Oxides of Nitrogen (NO_x) Emissions

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

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Scale: NTS

Date Revised: July 18, 2001

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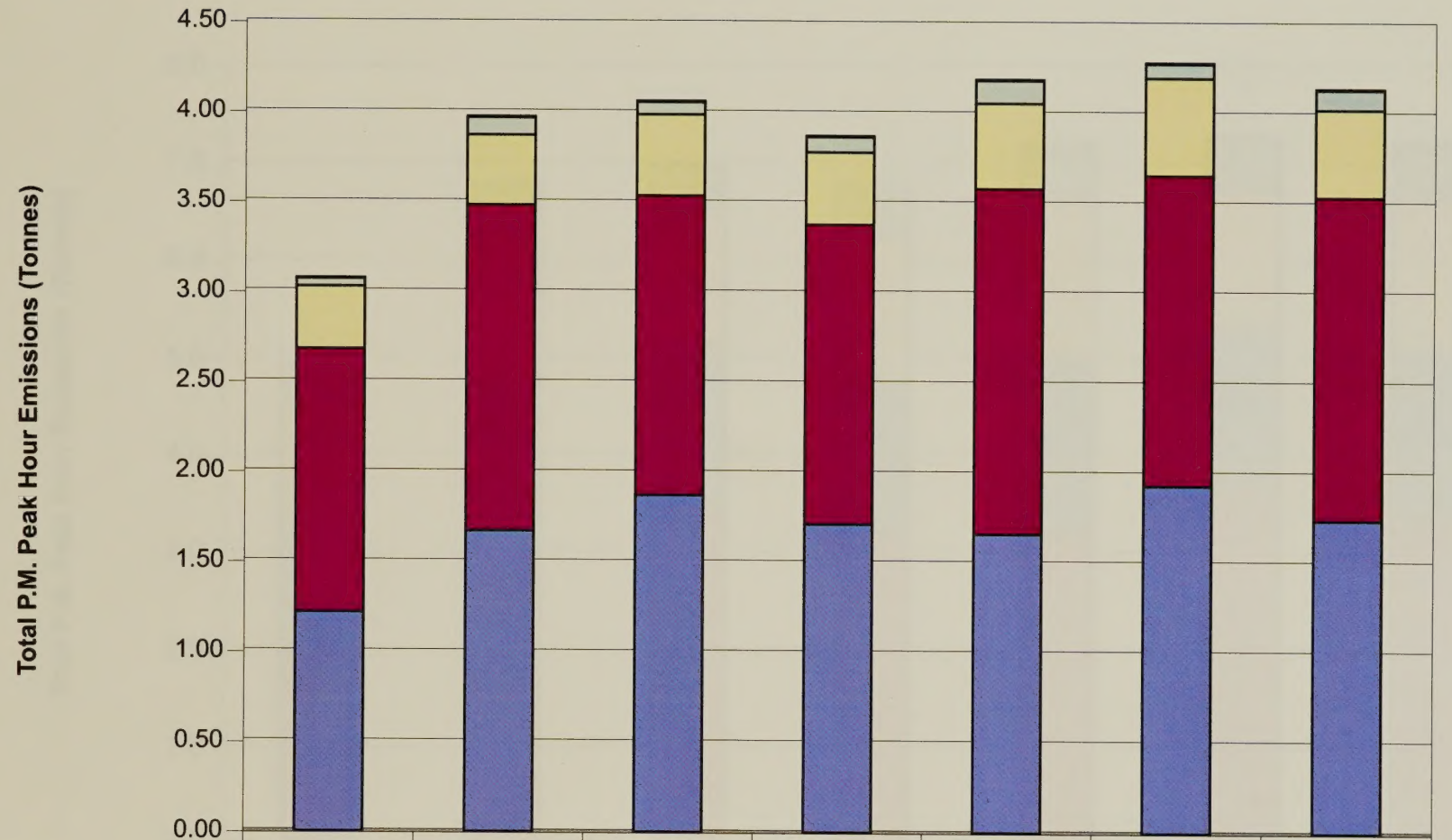

	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Trucks Regional	0.04	0.10	0.07	0.08	0.13	0.08	0.11
Trucks Provincial	0.34	0.39	0.45	0.40	0.48	0.54	0.49
Auto Regional	1.46	1.81	1.66	1.66	1.92	1.73	1.80
Autos Provincial	1.22	1.67	1.87	1.71	1.66	1.93	1.74

Scenarios

Oxides of Nitrogen (NO_x) Emissions - Autos & Trucks

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

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Scale: NTS
Date Revised: July 18, 2001

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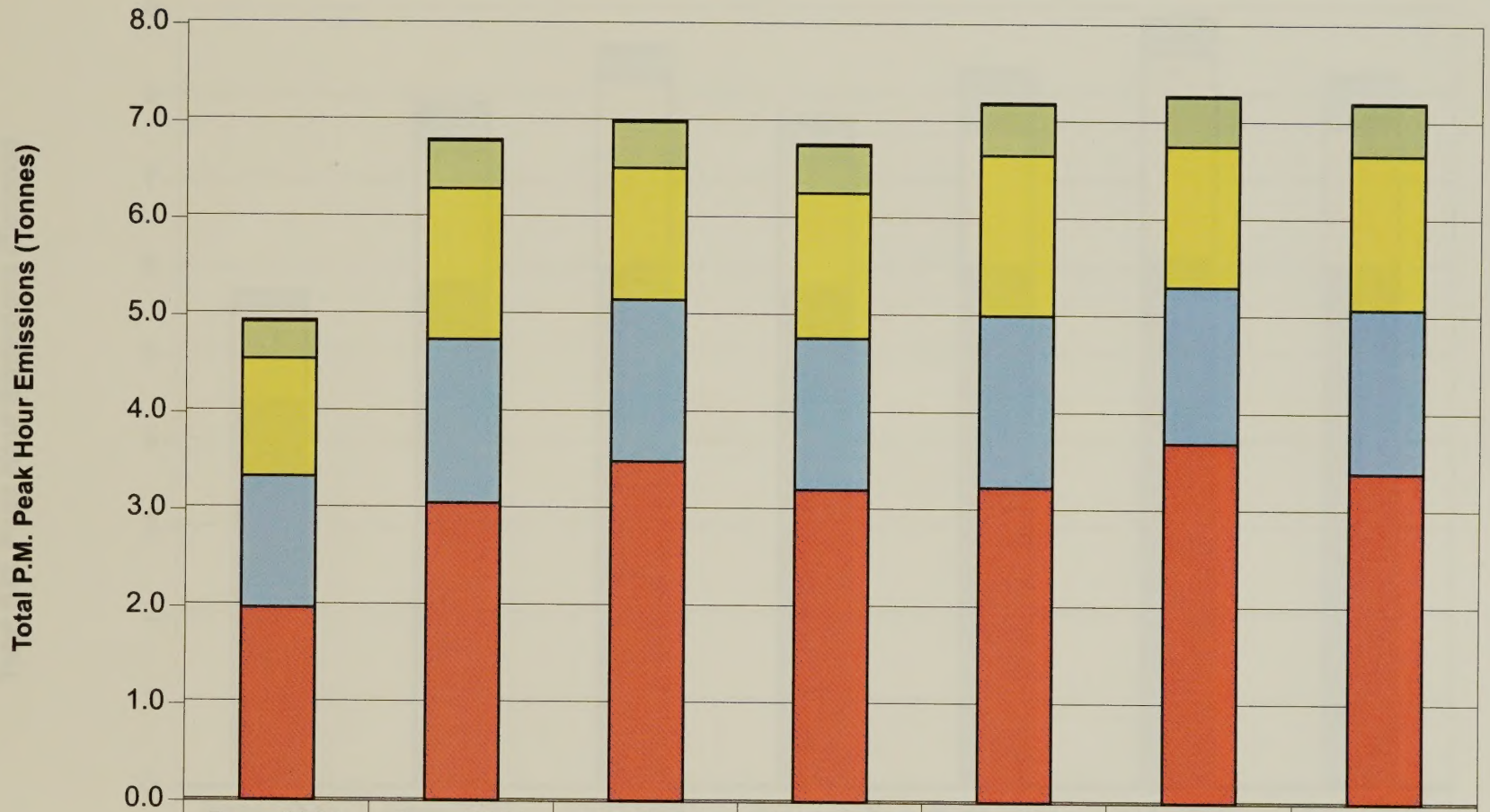

	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Burlington Regional	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Hamilton Regional	1.2	1.5	1.4	1.5	1.7	1.5	1.6
Niagara Regional	1.4	1.7	1.7	1.6	1.8	1.6	1.7
Provincial	2.0	3.1	3.5	3.2	3.2	3.7	3.4

Scenarios

Inhalable Particulate (PM_{10}) Emissions

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

Drawn by: SWJ | Figure: 8

Scale: NTS

Date Revised: July 18, 2001

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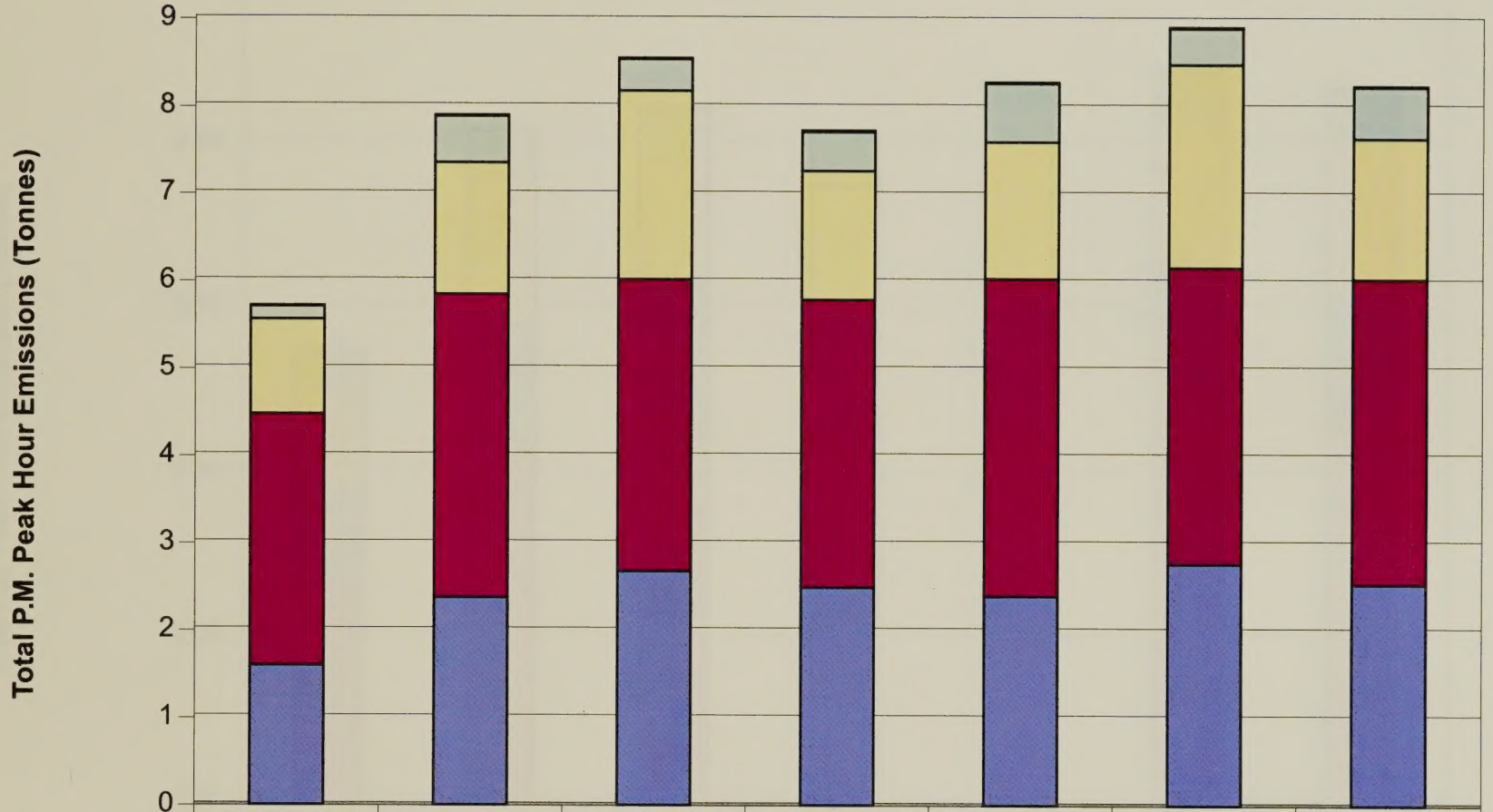

	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Trucks Regional	0.14	0.53	0.36	0.45	0.67	0.41	0.59
Trucks Provincial	1	2	2	1	2	2	2
Autos Regional	3	3	3	3	4	3	3
Autos Provincial	2	2	3	2	2	3	3

Scenarios

Inhalable Particulate (PM_{10}) Emissions - Autos & Trucks

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

Drawn by: SWJ | Figure: 9

Scale: NTS

Date Revised: July 18, 2001

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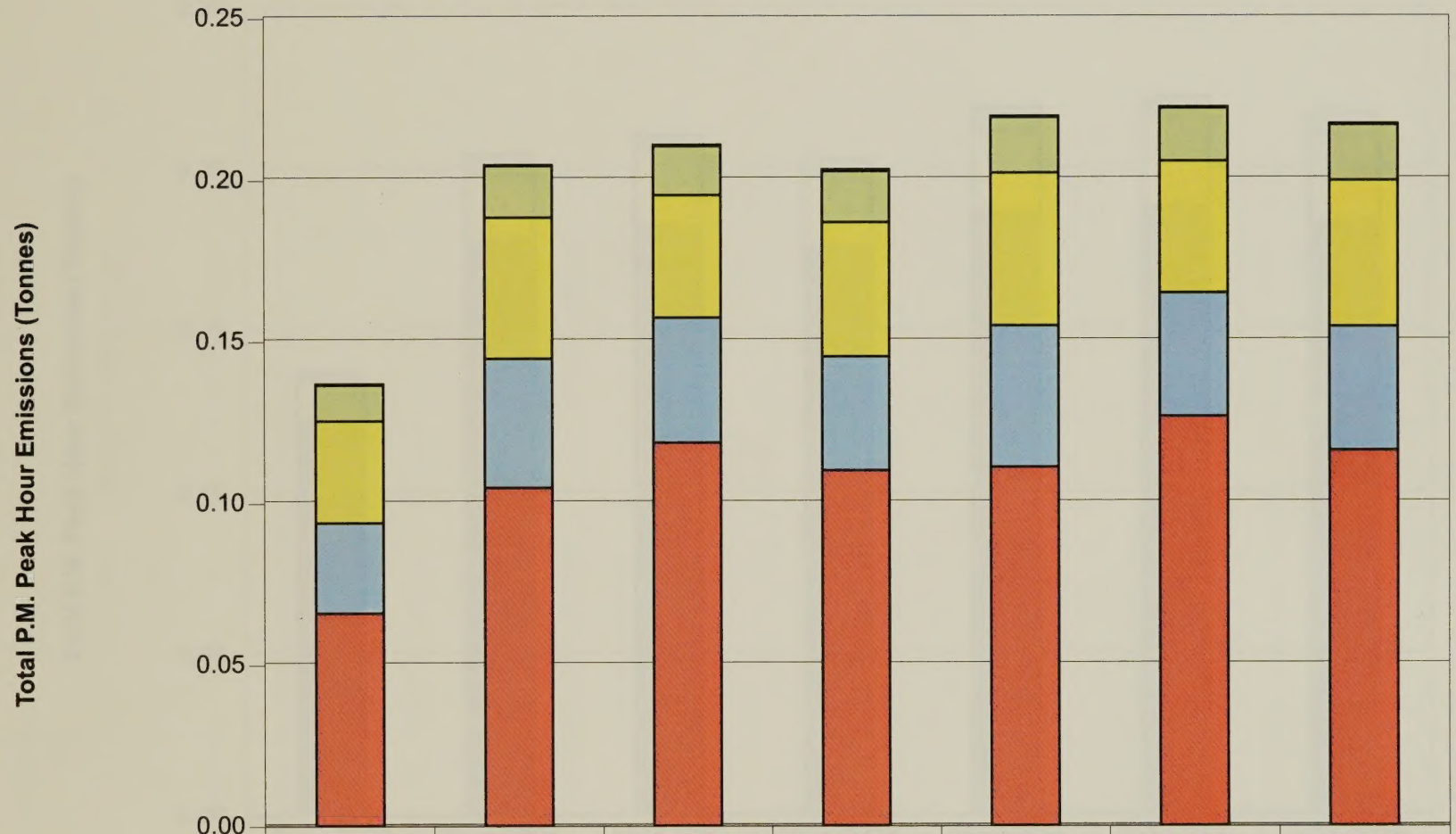


	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Burlington Regional	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Hamilton Regional	0.03	0.04	0.04	0.04	0.05	0.04	0.05
Niagara Regional	0.03	0.04	0.04	0.04	0.04	0.04	0.04
Provincial	0.07	0.10	0.12	0.11	0.11	0.13	0.12

Scenarios

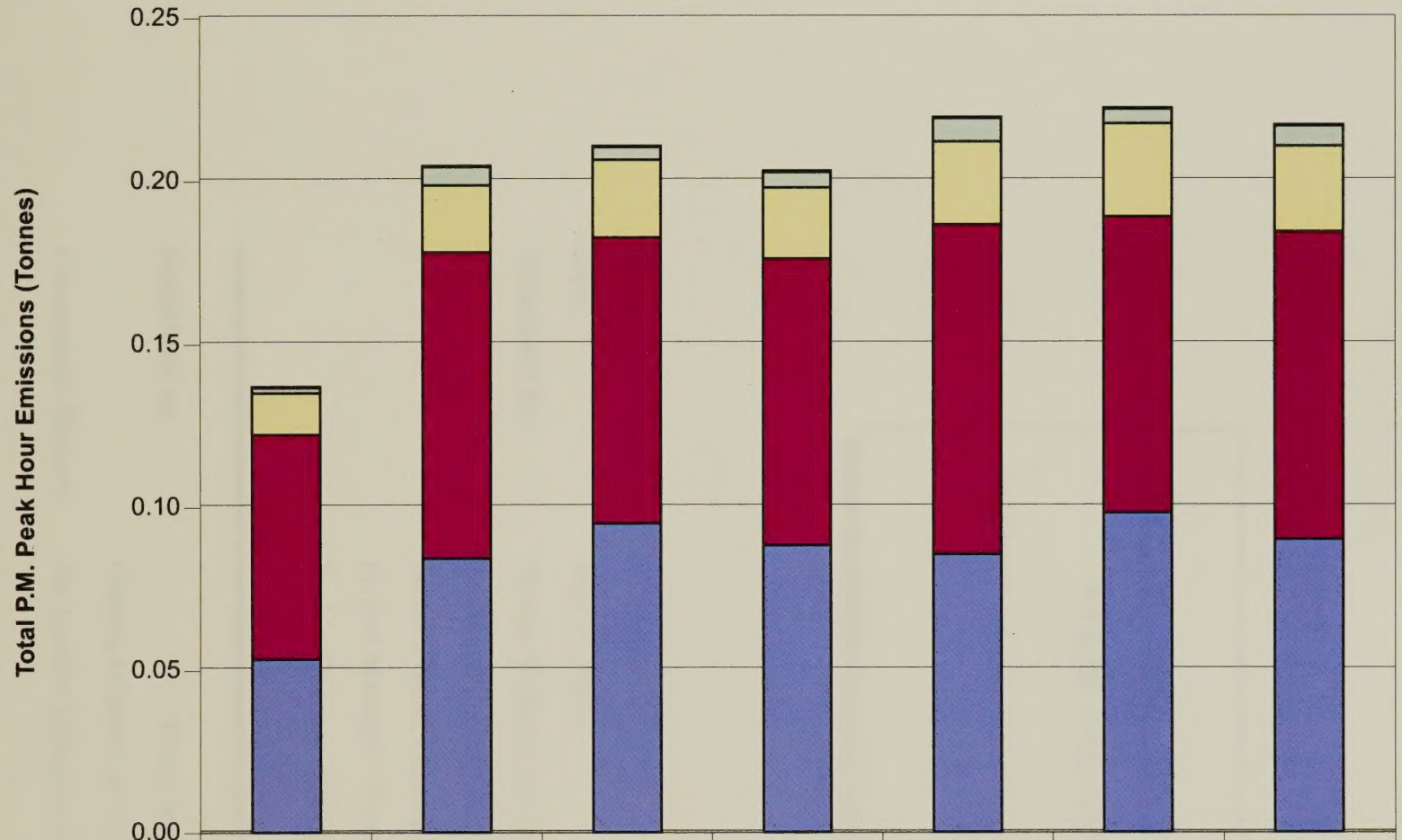
Sulphur Dioxide (SO_2) Emissions

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

Drawn by: SWJ | Figure: 10
Scale: NTS
Date Revised: July 18, 2001

RWDI



	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Trucks Regional	0.00	0.01	0.00	0.00	0.01	0.00	0.01
Trucks Provincial	0.01	0.02	0.02	0.02	0.03	0.03	0.03
Autos Regional	0.07	0.09	0.09	0.09	0.10	0.09	0.09
Autos Provincial	0.05	0.08	0.09	0.09	0.09	0.10	0.09

Scenarios

Sulphur Dioxide (SO_2) Emissions - Autos & Trucks

Niagara Peninsula Transportation Needs Assessment Study
Air Quality Emissions Inventory

Project #01-380

Drawn by: SWJ | Figure: 11
Scale: NTS
Date Revised: July 18, 2001

RWDI

NIAGARA PENINSULA TRANSPORTATION NEEDS ASSESSMENT STUDY

ENERGY CONSUMPTION AND CARBON DIOXIDE EMISSIONS

Project Number: 01-380B

Date: July 23, 2001

Submitted By: Rowan Williams Davies & Irwin Inc.

Technical Coordinator - Melissa Annett, d.E.T.

Senior Project Engineer - Sharon Schajnoha, P.Eng.

Project Manager- Monika Greenfield, M.Sc.

Project Director - David Chadder, Hon.B.Sc., QEP

Submitted to: Totten Sims Hubicki Associates

Ontario Ministry of Transportation

Companion Report: Air Quality Emission Inventory

TABLE OF CONTENTS

Page No.

1. INTRODUCTION 1

2. METHODOLOGY 2

   2.1 Estimation of Emission Factors 2

   2.2 Development of Emission Inventories 2

3. RESULTS 3

4. DISCUSSION 6

5. CONCLUSIONS AND RECOMMENDATIONS 7

6. REFERENCES 8

APPENDIX

FIGURES

1. INTRODUCTION

Rowan, Williams, Davies and Irwin (RWDI) was retained by Ministry of Transportation Ontario (MTO) through Totten Sims Hubicki (TSH) Associates to provide air emissions inventories for a number of different transportation network scenarios in the Niagara Peninsula Transportation Corridor. Tailpipe and other vehicle related emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2), and inhalable particulate matter (PM_{10}) were considered in a separate report [1]. This report considers greenhouse gases related to vehicular emissions of carbon dioxide (CO_2) only. Although greenhouse gas emissions include nitric oxide (N_2O), which is a very potent greenhouse gas (global warming potential is approximately 300 times that of CO_2), N_2O emissions constitute about 1% of total NO_x emissions and are expected to increase total greenhouse gas emissions by a maximum of 10%.

Emission inventories were developed for the following seven traffic scenarios for CO_2. These scenarios were selected for use in the study by MTO.

- Base 2000: present traffic on existing road corridors;
- Base 2021: road systems unchanged from present;
- QEW 2021: QEW widened, mid-peninsula corridor (MPC) not built;
- MPC 2021: construction of MPC corridor, no alterations to QEW;
- Base 2031: road system unchanged from present;
- QEW 2031: QEW widened, MPC not built; and,
- MPC 2031: construction of MPC corridor, no alterations to QEW.

The traffic data used in this analysis was provided by TSH. These data were developed using EMME/2, a travel demand modelling package.

The total CO_2 emissions over the peak P.M. hour were estimated for each of the above scenarios for regional and provincial roadways. The analysis did not consider geographical locations, grade changes for each of the links, existing air quality or local meteorological conditions.

2. METHODOLOGY

Factors that affect the CO_2 emission loadings include vehicle mixes, roadway lengths and traffic volumes for the various roadway options. A discussion of the methodology is provided in this section in addition to the assumptions applied in the analysis.

2.1 Estimation of Emission Factors

RWDI contacted the U.S. EPA's National Vehicle and Fuel Emissions Lab to determine a methodology for estimating emissions of CO_2. It was recommended that these emissions be estimated based on the fuel economy of the fleet assuming that all of the carbon is emitted as CO_2 [2]. Fuel economy data from 1998 National Transportation Statistics and published by the U.S. Department of Transportation was used for this analysis [3]. These data indicated that average fuel consumption for cars, motorcycles and trucks are 9.1 km/L, 21 km/L and 2.7 km/L, respectively. The resultant CO_2 emission factors were found to be 257 g/vehicle-km and 853 g/vehicle-km for cars and trucks, respectively. This approach is very simplistic because it does not account for improvements of fuel economy with changes in vehicle speed. It is, however, the best technique available at this time. A future version of MOBILE6 (version 6.3) is expected to provide improved emission factors for CO_2, and may require detailed traffic information such as a vehicle kilometres travelled breakdown by speed for each roadway link.

2.2 Development of Emission Inventories

CO_2 emission inventories were developed for each of the seven scenarios. TSH provided RWDI with the scenarios which included link length, number of lanes, peak PM traffic volumes, and vehicle mix (Automobile-Tourist, Automobile-Local and Truck). Emission factors were calculated for each link based on the vehicle mix and the total traffic volumes. Emission rates were subsequently calculated for each link based on the total volume. These emission rates for the various links were summed according to their categorization (i.e., Niagara Regional, Burlington Regional, Hamilton Regional or Provincial).

In addition to predicting contaminant emissions for each scenario, calculations of total roadway length and total vehicle-kilometers travelled were conducted for each of the categories of interest.

3. RESULTS

The results for all seven scenarios are summarized in Tables 1 to 7 below. Figure 1 shows the total fuel consumption for each of the seven scenarios, with auto and truck fractions shown separately. Figure 2 shows total PM peak traffic emissions of CO_2 as calculated for each scenario and further divided into the provincial and Niagara regional, Hamilton regional and Burlington regional totals. The further split of these data into auto and truck fractions are provided in Figure 3.

Table 1: Base 2000 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,628	2,380,849	70.8	643.4
Provincial Total	817	1,044,005	73.3	305.9
Niagara Regional	2,023	532,311	72.5	133.9
Hamilton Regional	1,418	588,270	69.9	150.2
Burlington Regional	370	216,263	54.9	53.3
Regional Total	3,811	1,336,844	69.8	337.5

Table 2: Base 2021 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,722	3,427,273	64.6	960.2
Provincial Total	826	1,661,152	67.1	489.1
Niagara Regional	1,995	708,613	65.9	189.1
Hamilton Regional	1,510	766,054	64.4	206.4
Burlington Regional	391	291,454	48.1	75.6
Regional Total	3,896	1,766,122	63.5	471.1

Table 3: MPC 2021 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,990	3,522,193	68.7	988.8
Provincial Total	1,053	1,875,474	72	553.9
Niagara Regional	2,072	699,219	68.7	183.8
Hamilton Regional	1,478	673,076	66.7	179.7
Burlington Regional	388	673,076	49.9	71.4
Regional Total	3,937	1,646,719	66.1	434.9

Table 4: QEW 2021 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,646	4,116,813	66.9	952.7
Provincial Total	825	1,413,858	70.3	513.9
Niagara Regional	1,940	1,206,079	69.4	166.6
Hamilton Regional	1,490	1,094,917	65.4	196.5
Burlington Regional	391	401,958	48.1	75.5
Regional Total	3,822	2,702,955	65.7	438.7

Table 5: Base 2031 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,754	4,384,360	62.8	1,028.2
Provincial Total	831	1,399,914	64.9	516.5
Niagara Regional	2,012	1,370,293	63.9	207.2
Hamilton Regional	1,520	1,185,182	63.1	223.2
Burlington Regional	392	428,971	46.5	81.3
Regional Total	3,924	2,984,446	61.8	511.7

Table 6: MPC 2031 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,889	4,172,232	67.4	1,041.6
Provincial Total	1,054	1,378,128	70.7	590.6
Niagara Regional	1,961	1,294,952	67.3	181.3
Hamilton Regional	1,485	1,089,167	65.8	192.5
Burlington Regional	389	409,985	48.1	77.2
Regional Total	3,835	2,794,104	64.8	451.1

Table 7: QEW 2031 Results

Roads	Total Roadway Length (km)	Vehicle Kilometers Travelled	Average Congested Speed (km/h)	Total P.M. Peak Hour CO_2 Emissions (tonnes)
Total (all)	4,676	4,322,301	65.3	1,017.5
Provincial Total	826	1,456,773	68.5	540.9
Niagara Regional	1,966	1,276,108	67.5	181.8
Hamilton Regional	1,493	1,157,446	64.4	213.1
Burlington Regional	392	431,974	46.3	81.7
Regional Total	3,851	2,865,528	64.2	476.6

4. DISCUSSION

The scenarios provided to RWDI by TSH were in the form of spreadsheet tables containing quantitative information such as link length, volumes, vehicle mix and vehicle speed information. Appendix A contains an exerpt from one of these spreadsheets. The following discussion is limited to general trends in total emissions and does not attempt to analyse the results based on details of the scenarios.

Figure 1 provides a breakdown of total fuel consumption for each of the seven scenarios, split into the following categories: trucks regional, trucks provincial, autos regional and autos provincial. The results indicate that autos consume the highest quantities of fuel, with the regional road contribution being somewhat higher than the provincial, and that the trucks consume much less than the autos overall with most of this being on the provincial (as opposed to the regional) roads. These results are as expected, and are due largely to the greater volumes of cars on all roads, and the greater number of trucks travelling on the provincial highways as opposed to regional roads. A comparison of the seven scenarios shows that the numbers increase with the greater volumes of traffic predicted for the future scenarios. The fuel consumption for the "QEW" scenario is less than that for both the base and "MPC" scenarios for 2021 and 2031. The fuel consumption ranges from approximately 278,300 L (Base 2000) to 443,800 L ("MPC" 2031) during the peak PM hour on the roads considered in this study.

The comparison of the CO_2 emissions for the seven scenarios presented in Figure 2 indicates that the "QEW" scenario results in slightly lower emissions compared to the "Base" and the "MPC" scenarios for both the 2021 and the 2031 analyses. Fuel economy of vehicles is expected to improve over time, which could not be accounted for in this analysis. Therefore, CO_2 emissions may be expected to be overestimated for 2021 and 2031. In addition, as previously discussed, the emission factors do not account for changes in vehicle speed. Therefore benefits of improved congested speed, which in reality would result in decreased CO_2 emissions, could not be considered.

Figure 3 shows that trucks account for between approximately 9% (Base 2000) and 14% (all 2031 scenarios) of total CO_2 emissions for all scenarios.

5. CONCLUSIONS AND RECOMMENDATIONS

The "QEW" scenario resulted in slightly lower emissions compared to the "Base" and "MPC" scenarios for both the 2021 and 2031 analyses. Truck traffic was calculated to account for between 9% and 14% of total CO_2 emissions for all scenarios.

The emission model used to estimate emission factors for CO_2 does not reflect future vehicular technologies or regulations and thus total emissions calculated for future scenarios are likely overestimated. As well, the approach used in this analysis is very simplistic because it does not account for improvements of fuel economy with changes in vehicle speed. However, it is not likely the relative comparison between scenarios within a given year will change significantly with updated emission factor models. If these results are intended to be used for more than a comparative analysis, it is recommended that the results be updated using MOBILE6 v.3 once it is available to the public, as it is expected that this model will account for variable vehicle speeds. Lastly, it should be noted that the analysis was done using peak PM traffic values only, and it may be worthwhile to undertake further analyses considering non-peak traffic conditions or average daily movements.

6. REFERENCES

1. Rowan Williams Davies & Irwin Inc. *Niagara Peninsula Transportation Needs Assessment Study - Air Quality Emission Inventory*. RWDI Report # 01-380A. July 23, 2001.

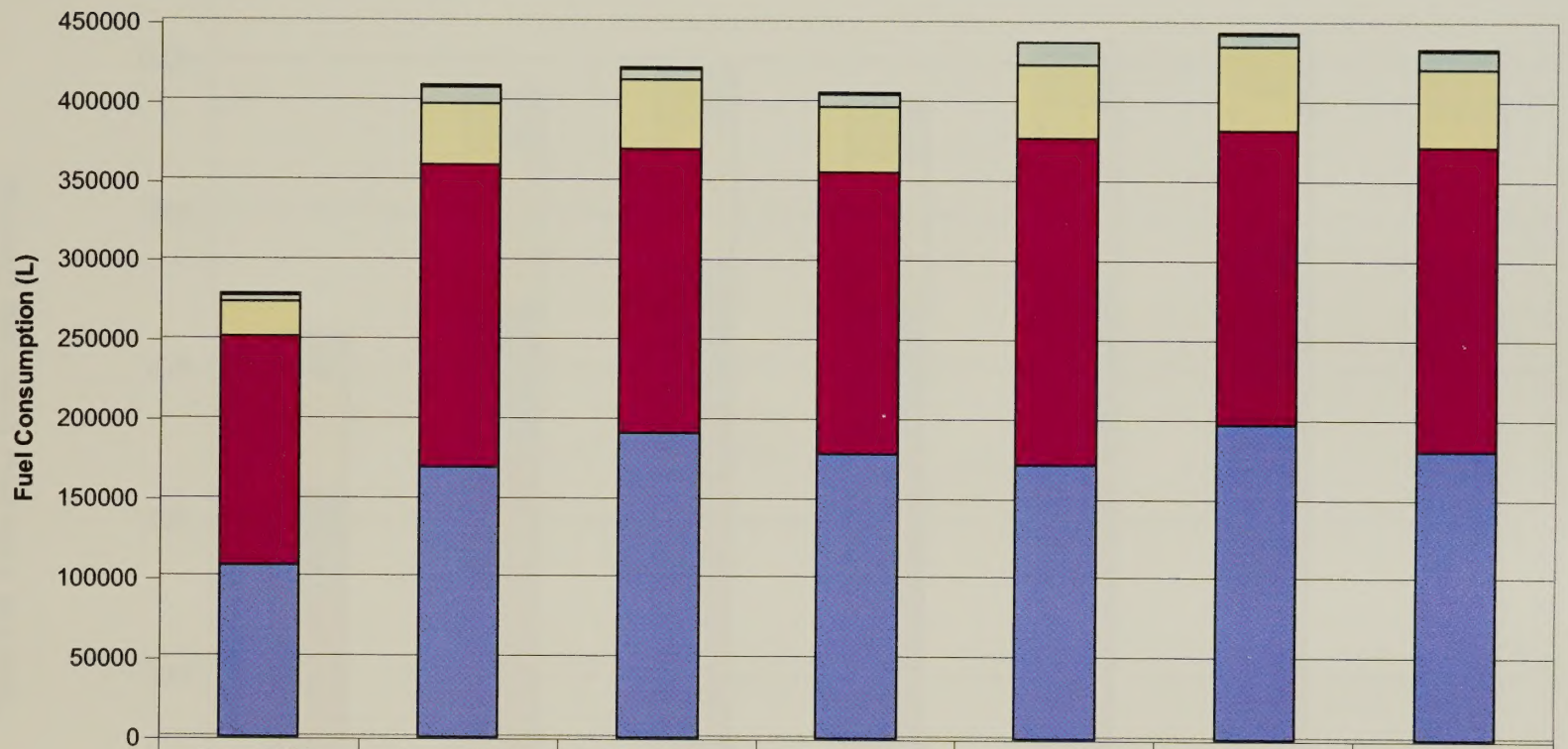
2. Fax Memorandum sent to Ms. Sharon Schajnoha, Sr. Project Engineer, RWDI from Ms. Deborah Adler, Environmental Scientist, National Vehicle And Fuel Emissions Lab, U.S. EPA. February 2001.

3. United States Department of Transportation. National Transportation Statistics. **www.bts.gov/btsprod/nts/apxbv.html**. February 23, 2001.

APPENDIX A

MTO - Niagara Needs Assessment
Link Assessment Information
Year 2000 - P.M. Peak Hour Volumes

Region	Facility Type	Link Information Link Code	Coordinate - Node i, Node j Xi	Yi	Xj	Yj	# of Lanes	Length (km)	Capacity (vpl)	Posted Speed (km/h)	Congested Speed (km/h)	Assigned Volume Auto	Auto - Tourists	Trucks	Total Volume	V/C	LOS	LOS Based Speed (km/h)
Niagara	MTO	11	640607	781850	640840	781870	1	0.15	1200	60	28	977	178	131	1286	1.07	F	15
		11	623750	782600	624280	782700	1	0.54	1200	60	39	1020	259	0	1279	1.07	F	15
		11	641060	782000	640620	781980	2	0.44	2400	90	66	1493	720	187	2400	1.00	F	22.5
		11	640620	781980	639990	781730	2	0.68	2400	90	39	2184	715	187	3086	1.29	F	22.5
		11	639990	781730	639448	781741	2	0.57	2400	90	62	1592	714	187	2492	1.04	F	22.5
		11	642200	781720	643320	781450	2	1.15	2400	90	66	1467	742	197	2406	1.00	F	22.5
		11	644620	776780	644360	776310	2	0.54	2400	90	40	2405	2	67	2474	1.03	F	22.5
		11	639720	781700	640000	781700	2	0.28	2400	90	39	2167	723	197	3087	1.29	F	22.5
		11	640000	781700	640607	781850	2	0.66	2400	90	39	2167	723	197	3087	1.29	F	22.5
		11	638380	781850	638050	781880	2	0.33	2400	90	55	1580	538	284	2403	1.00	F	22.5
		11	638731	781679	639720	781700	2	0.98	2400	90	64	1516	716	197	2430	1.01	F	22.5
		11	638040	781840	638731	781679	2	0.74	2400	90	42	1865	716	303	2885	1.20	F	22.5
		11	623280	782700	624280	782700	2	1	2400	90	49	1676	454	303	2434	1.01	F	22.5
		11	636940	781940	638040	781840	2	1.1	2400	90	49	1694	713	303	2710	1.13	F	22.5
		11	641980	781790	641060	782000	2	0.94	2400	90	66	1493	720	187	2400	1.00	F	22.5
		11	640850	767710	640050	767280	1	0.91	800	70	44	702	50	0	752	0.94	E	35
		11	644760	781000	644897	780964	1	0.15	1200	70	40	1097	27	12	1136	0.95	E	35
		11	643300	779700	643080	779790	1	0.24	1200	50	34	1002	0	0	1002	0.83	D	40
		11	641700	768220	640850	767710	1	0.99	800	80	50	702	50	0	752	0.94	E	40
		11	642480	768750	641700	768220	1	0.94	800	80	50	702	50	0	752	0.94	E	40
		11	618060	772710	618170	772510	1	0.23	800	50	32	688	0	0	688	0.86	D	40
		11	644600	777840	644660	777240	2	0.6	2400	90	48	2191	0	67	2258	0.94	E	45
		11	643620	779440	644080	779160	2	0.54	2400	90	48	2191	0	67	2258	0.94	E	45
		11	651110	778390	651620	777740	2	0.83	2400	90	59	1769	319	133	2220	0.93	E	45
		11	638050	781880	636960	781980	2	1.09	2400	90	59	1485	538	284	2307	0.96	E	45
		11	624280	782720	623280	782740	2	1	2400	90	54	1602	513	284	2400	1.00	E	45
		11	650190	779190	651110	778390	2	1.22	2400	90	59	1769	319	133	2220	0.93	E	45
		11	653060	773880	652960	774980	2	1.1	2400	90	61	1695	435	143	2273	0.95	E	45
		11	644080	779160	644600	777840	2	1.42	2400	90	48	2191	0	67	2258	0.94	E	45
		11	640050	767280	639640	767060	1	0.47	900	60	44	702	50	0	752	0.84	D	48
		11	637400	782130	636960	781980	1	0.46	1200	60	50	796	175	0	972	0.81	D	48
		11	617220	783480	617480	783420	1	0.27	1200	60	43	948	38	0	985	0.82	D	48
		11	639990	781730	640010	781950	1	0.22	1200	50	47	592	1	0	594	0.49	A	50
		11	643870	775680	643940	775620	1	0.09	1200	50	50	0	0	0	0	0.00	A	50
		11	643690	775360	643580	775420	1	0.13	1200	50	50	0	0	0	0	0.00	A	50
		11	657360	772320	657554	772497	2	0.06	2400	50	50	89	556	23	667	0.28	A	50
		11	641640	750730	641380	750460	1	0.37	800	50	50	153	9	0	162	0.20	A	50
		11	641640	750730	642020	750820	2	0.39	1000	50	50	216	2	0	218	0.22	A	50
		11	644120	751120	643660	751150	2	0.46	1600	50	50	401	14	0	414	0.26	A	50



	Base 2000	Base 2021	MPC 2021	QEW 2021	Base 2031	MPC 2031	QEW 2031
Trucks Regional	4283	10523	7175	8846	13171	8074	11617
Trucks Provincial	21008	37906	43802	40233	47015	52811	48360
Autos Regional	145065	190198	178129	178075	204833	184114	191447
Autos Provincial	107971	170503	192200	178743	173055	198813	182094

Scenarios

Total Fuel Consumption

Niagara Peninsula Transportation Needs Assessment Study
Energy Consumption and Carbon Dioxide Emissions

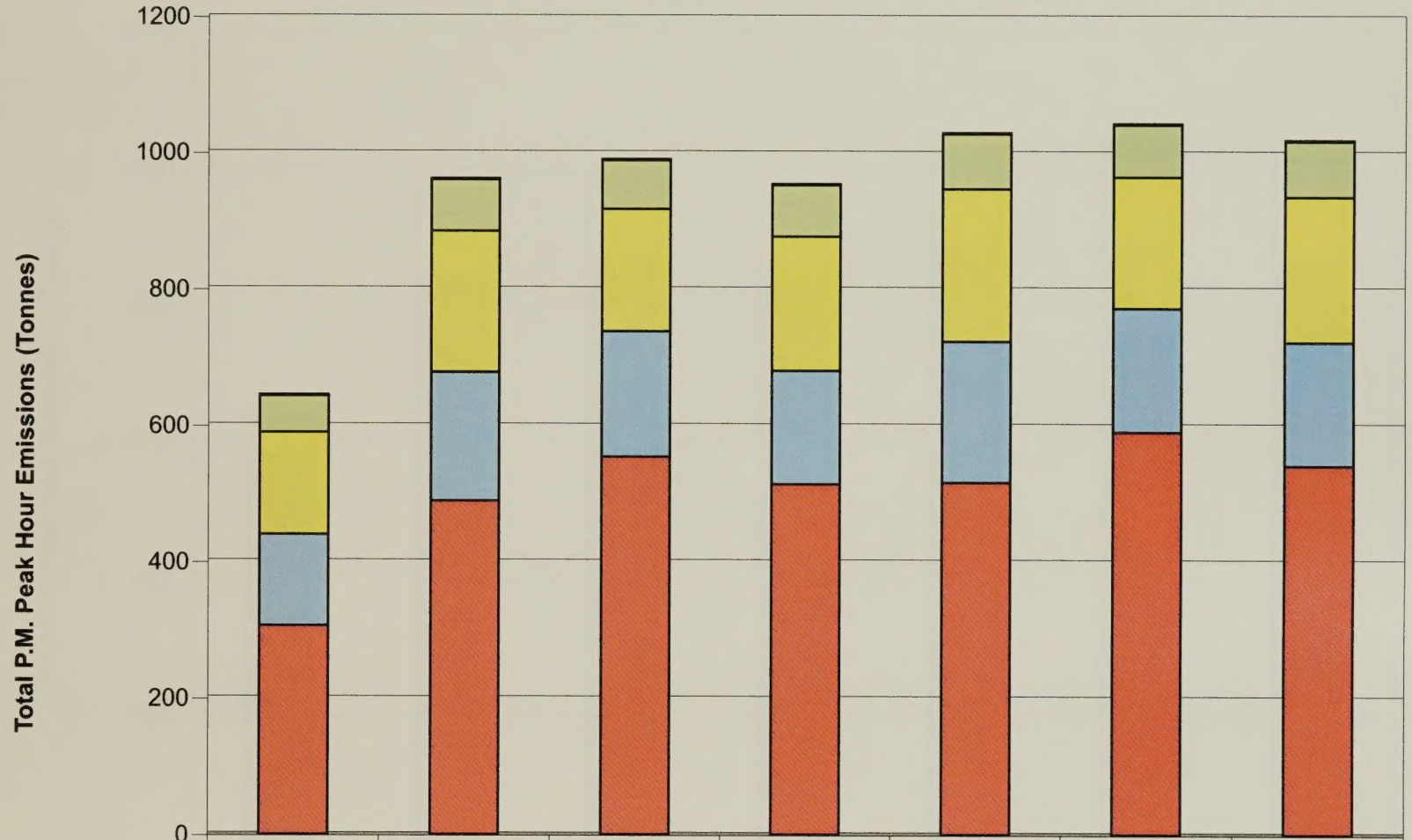
Project #01-380

Drawn by: SWJ | Figure: 1

Scale: NTS

Date Revised: July 18, 2001

RWDI



	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Burlington Regional	53	76	71	76	81	77	82
Hamilton Regional	150	206	180	197	223	192	213
Niagara Regional	134	189	184	167	207	181	182
Provincial	306	489	554	514	517	591	541

Scenarios

Carbon Dioxide (CO_2)Emissions

Niagara Peninsula Transportation Needs Assessment Study
Energy Consumption and Carbon Dioxide Emissions

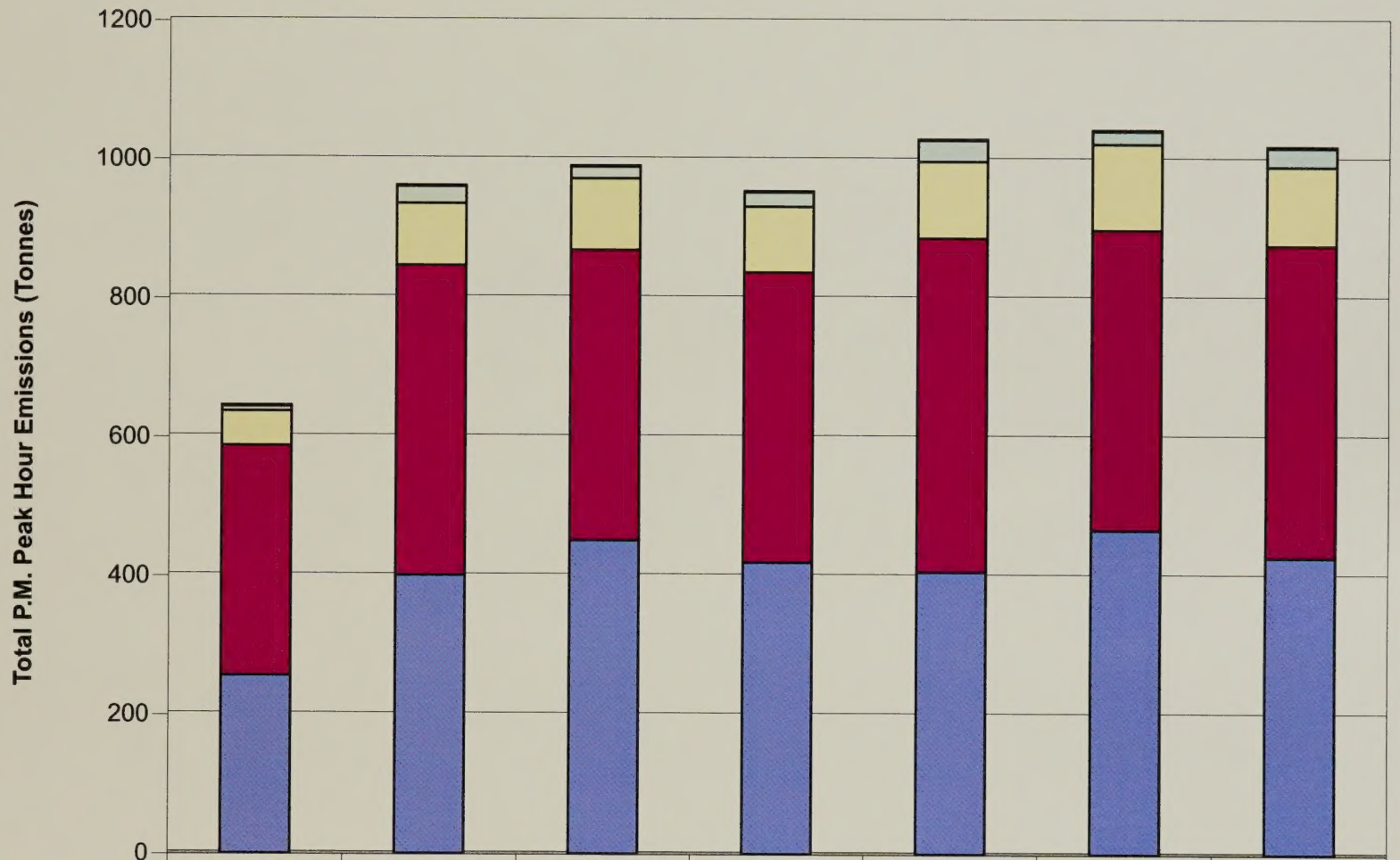
Project #01-380

Drawn by: SWJ | Figure: 2

Scale: NTS

Date Revised: July 18, 2001

RWDI



	Base 2000	Base 2021	2021 MPC	2021 QEW	Base 2031	2031 MPC	2031 QEW
Trucks Regional	7	25	17	21	31	19	27
Trucks Provincial	50	89	103	94	110	124	114
Autos Regional	331	446	418	418	481	432	449
Autos Provincial	256	400	451	420	406	467	427

Scenarios

Carbon Dioxide (CO_2) Emissions - Autos and Trucks

Niagara Peninsula Transportation Needs Assessment Study
Energy Consumption and Carbon Dioxide Emissions

Project #01-380

Drawn by: SWJ | Figure: 3

Scale: NTS

Date Revised: July 18, 2001

RWDI

Ontario
Ministry of Transportation

NIAGARA PENINSULA TRANSPORTATION NEEDS ASSESSMENT

SOCIO ECONOMIC WORK STREAM

- SUMMARY REPORT -

engineers
architects
planners

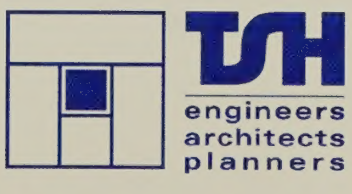
McCormick Rankin
Corporation

October 2001

NIAGARA PENINSULA TRANSPORTATION NEEDS ASSESSMENT

SOCIO-ECONOMIC WORK STREAM

SUMMARY REPORT



McCormick Rankin Corporation

in association with

- The Planning Partnership
- Arthur Anderson
- O'Dell Management

TABLE OF CONTENTS

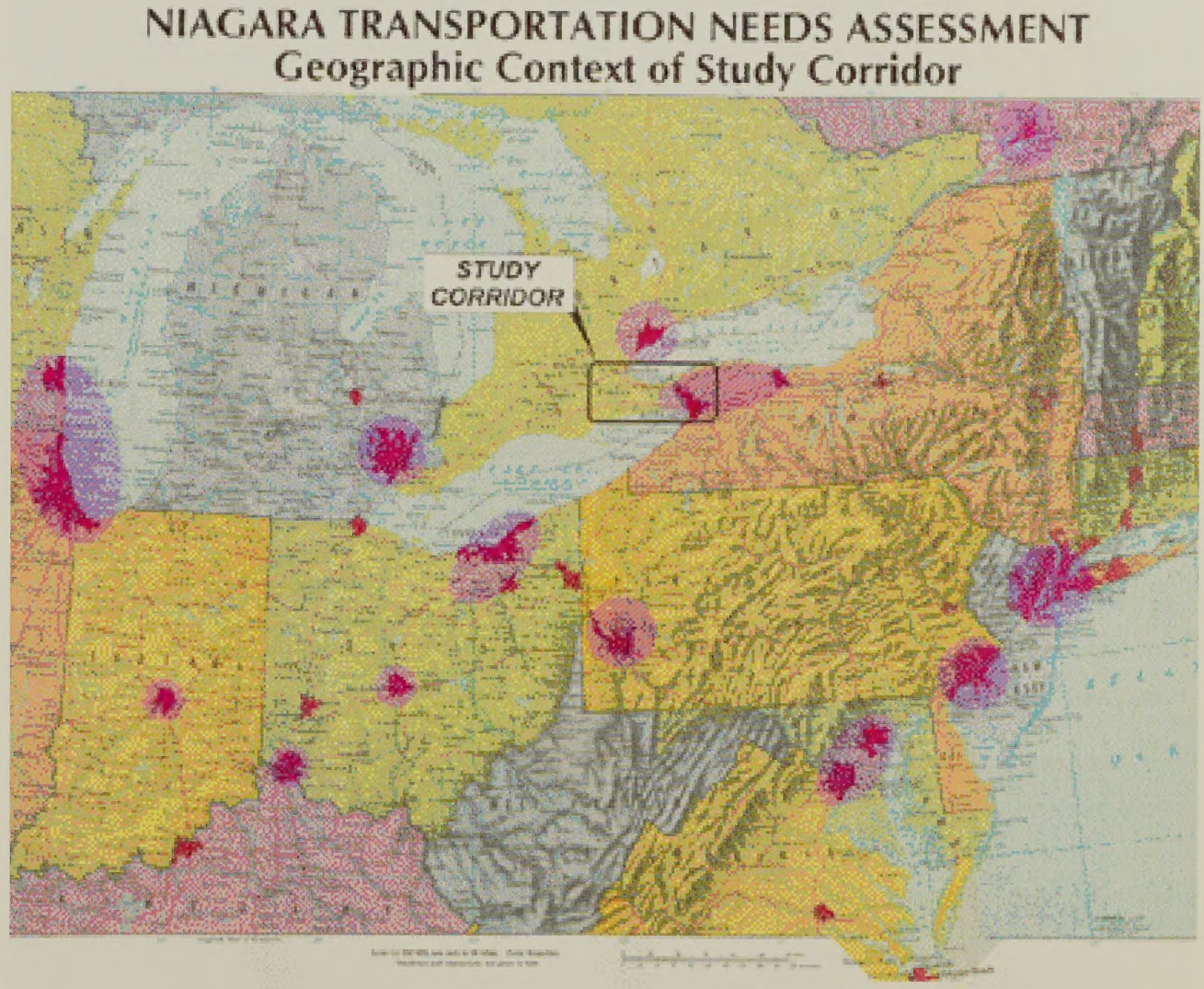
		Page
1.	INTRODUCTION	1
	1.1 Study Area	1
	1.2 Approach	3
2.	INTERNATIONAL TRADE AND GOODS MOVEMENT	4
	2.1 Overview	4
	2.2 Outlooks	8
	2.3 Transportation Implications	11
3.	TOURISM	15
	3.1 Overview	15
	3.2 Outlooks	17
	3.3 Transportation Implications	21
4.	LAND USE AND DEMOGRAPHICS	25
	4.1 Overview	25
	4.2 Outlooks	27
	4.3 Transportation Implications	31

APPENDIX 1 Copies of Slides used at the December 5, 2000 Socio-Economic Workshop

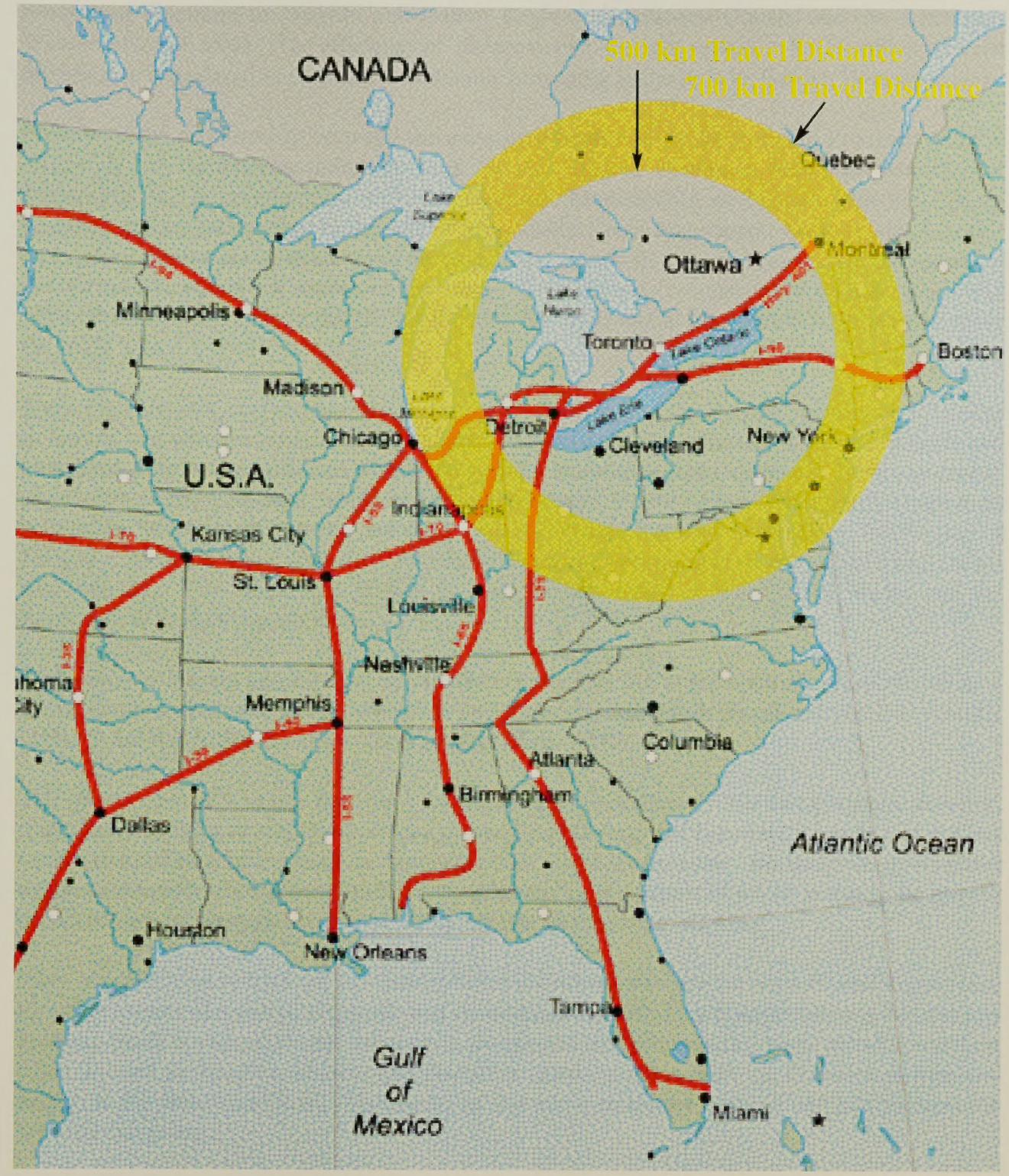
1. INTRODUCTION

1.1 Study Area

The Niagara Peninsula area is strategically located in central Ontario acting as an international trade and tourism gateway between the Greater Toronto Area and southwestern Ontario and the United States. Some 120 million people and major industries and markets in neighbouring states are within one days drive from the study area. International trade and goods movement through the peninsula into Canada's economic heartland are critical to the regional, provincial and national economies.



The Regional Municipality of Niagara is part of a unique bi-national region spanning the Niagara River. With four international road bridge crossings and major tourist attractions, the Niagara area is both a major tourism gateway and a growth centre in the Ontario. Given that about 16% of all US/Canada binational trade crosses at the gateway, the long term viability of the international crossings is clearly fundamental to trade, tourism and economic growth in the region, the province and country.


CANADA
500 km Travel Distance
700 km Travel Distance
Quebec
Ottawa
Montreal
Minneapolis
Toronto
Boston
Madison
Chicago
Detroit
Cleveland
New York
U.S.A.
Kansas City
St. Louis
Louisville
Nashville
Memphis
Columbia
Atlanta
Birmingham
Dallas
Atlantic Ocean
Houston
New Orleans
Tampa
Gulf
of
Mexico
Miami

The new City of Hamilton is also in a unique position linking the Niagara area to the Greater Toronto Area and southwestern Ontario. The QEW and Highways 403, 6 and 8 are key highways connecting Hamilton to Niagara and Halton Regions, Haldimand County and the Kitchener-Waterloo-Guelph areas. The efficiency of the provincial highway system in the Hamilton area can therefore be considered as essential to economic prosperity in the broader Golden Horseshoe area.

In view of the relationship between the economic health of the Region and Province and the efficiency of the transportation network in the Niagara Peninsula area, the Ministry of Transportation, in co-operation with the Regional Municipality of Niagara and the City of Hamilton, carried out the Niagara Peninsula Transportation Needs Assessment. Socio-economic issues were a key component of this overall needs assessment and this report summarizes the results of the socio-economic work stream of the study. This analysis emphasises economic needs and opportunities as part of the need and justification for multi-modal transportation improvements in the study area.

The socio-economic analysis supports the intrinsic importance of the Niagara Peninsula and frontier as a trade and tourism corridor and gateway. The analysis also indicates that both Niagara and Hamilton were well positioned within the Golden Horseshoe Area to benefit from a potential population and employment "spillover" from the Greater Toronto Area. With traffic congestion increasing, housing prices rising and other "quality of life" concerns in the GTA, the Region of Niagara, City of Hamilton and other "hinterland" areas are becoming more attractive to households and industry. This hinterland growth is most evident today in the City of Barrie and the Kitchener-Waterloo-Guelph areas.

Both Niagara Region and the City of Hamilton recognize the importance of transportation as a means to attain economic growth objectives and shape regional development and they are currently carrying out regional planning work in support of new Official Plans.

The government of Ontario has also recognized the importance of the transportation network, trade corridors and gateways to continued prosperity in Ontario and is currently conducting various studies to examine improvements in major corridors across the province. Recently, the government announced support for the benefits of "Smart Growth", a key aspect of which is managing growth and development through integrated transportation and land use planning.

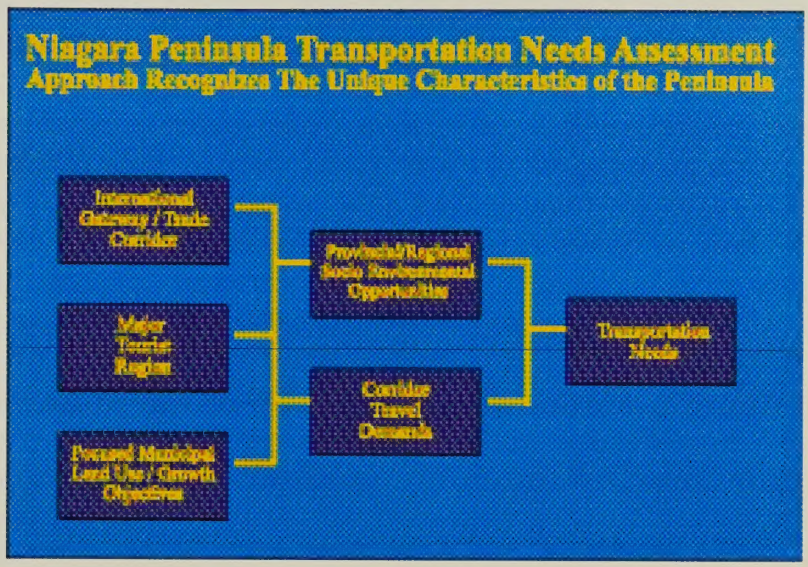
The consultant team pointed out that transportation improvements alone are not sufficient to guarantee the achievement of regional economic and development goals. That transportation is but one key building block for an economic strategy is recognized by the emerging trade corridor coalition being formed by Niagara, Halton, and Hamilton in co-operation with the Counties of Erie and Munro in the New York State. The results of this socio-economic analysis will complement the work of this group.

The socio-economic work stream examines the areas of trade, tourism and land use in terms of future outlooks and transportation implications.

1.2 Approach

Early on in the study the Project Team recognized that for this particular needs assessment, the socio-economic work stream could be considered in three key areas:

- international trade and goods movement;
- tourism; and
- land use and urban structure.



Experts within the consulting team in each of these three areas carried out some initial research and analysis and developed separate but compatible presentations on the three subjects. These presentations were given at a workshop involving senior staff from the Ministry and the Municipal partners on December 5, 2000.

In addition, the Consulting Team carried out a number of interviews with specific industries, shippers, carriers, Bridge crossing authorities, and transportation providers.

The results and conclusions of the socio-economic analysis were then presented in various forums, including the Project Team, senior Ministry and Municipal staff, and the Regional Chairs of Niagara and Halton and the Mayors of Hamilton and Haldimand County.

The final results of the socio-economic work stream have been documented in this report and incorporated fully into the overall technical report for the Niagara Peninsula Transportation Needs Assessment.

2. INTERNATIONAL TRADE AND GOODS MOVEMENT

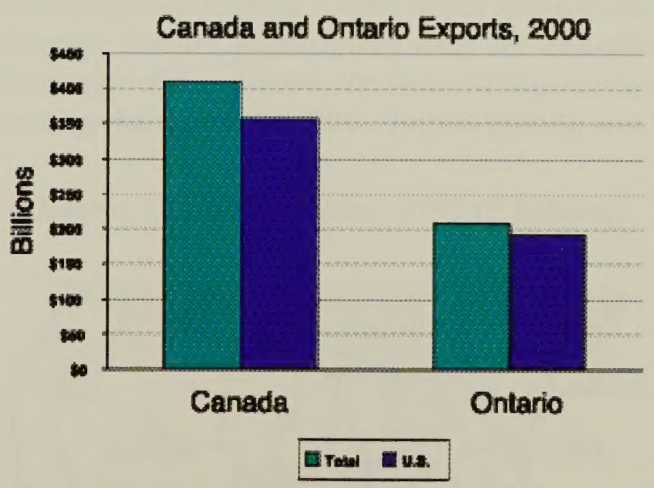
2.1 Overview

Canada and the United States have developed the largest bilateral trade relationship in the world with $590 billion in trade in 2000: about 77% of all Canadian international trade. This represents a tripling in trade by value since 1991. This unique trading relationship reflects the degree of integration of the Canadian and U.S. economies fostered by several trade agreements including the 1965 U.S.-Canada Auto Pact, the Canadian American Free Trade Agreement (CanAFta) and the recent North American Free Trade Agreement (NAFTA).

In 2000, trade with the U.S. accounted for $359 billion (87%) of total Canadian exports ($412B) and $230 billion (64%) of total Canadian imports ($356B). A key factor in the growth of exports is the American consumer demand for Canadian commodities. With the economic boom in the U.S. and Canada, coupled with the lower value of the Canadian dollar, American consumer demand for Canadian products such as automobiles has been very strong up to 2001. International trade with our other NAFTA partner, Mexico, is increasing, but totalled only $14 billion in 2000.

International trade with the U.S. is crucial to the Canadian economy with the value of exported goods representing 44% of Canada's Gross Domestic Product (GDP). This trade relationship is also important to the U.S. with exports to Canada accounting for 23% of total U.S. international exports - almost 60% more than sent to Mexico.

Ontario exported $207 billion of merchandise in 2000 with 93% ($193B) destined to the U.S. This represents a growth of 54% since 1996. Ontario imported a total of $227 billion in goods, of which 74% ($167B) was from the U.S. Imports from the U.S. grew by 43% over 1996-2000.



Total exports from Ontario accounted for about 50% of provincial GDP in 2000 compared to 29% in 1989. Increases in exports during the past four years account for 20% of Ontario's economic growth. Rising productivity, the comparatively low value of the Canadian dollar, Trade Agreements and government fiscal policy have supported Ontario's global competitiveness, export growth and job creation.

Ontario, with its well diversified economy, is the Canadian centre for the automobile industry and is highly integrated with industry and markets in the U.S. In 1999, Ontario manufactured more trucks, including SUVs and minivans, than any other jurisdiction in North America and ranks second in terms of auto production behind Michigan. While Canada produces far more vehicles for export to the U.S. than are sold in the country, Canada relies heavily on auto parts imported from the U.S. In 1999, Ontario motor vehicles, parts and accessories accounted for $80.3 billion in exports (about 41% of total exports) and $48.2 in imports (about 23% of total imports). Canada was responsible for about 19% of all North American motor vehicle production in 2000 compared to about an average of 14.5% between 1980 and 1990.

Increasing industry integration and rising regional specialization of in the North American industry underlies Ontario's import and export growth and economic prosperity. Shipments of automotive, machinery and electrical commodities represent 58% of total merchandise trade. Both imports from and exports to the U.S. have grown at a similar rate over the last ten years.

Within the study area the General Motors engine plant in St. Catharines is the major auto-sector industry. That plant announced a $440 million expansion investment in late 2000.

An extensive highway and rail system links Ontario's Golden Horseshoe Area to major manufacturing and population centres in New York, Michigan, Ohio, Illinois and Pennsylvania. These states accounted for 63% of Ontario trade by value and 57% by weight in 1999. Approximately 70% of all western New York's exports went to Ontario or the rest of Canada in 1997. The Counties of Erie and Niagara across the Niagara River have a particularly strong trade orientation to Ontario. Over 80% of all Ontario/US trade is with central and eastern US states.

Both road and rail transport play a key role in the movement of goods across the Ontario-U.S. border. Almost 70% of all Canadian exports and 60% of imports by value are shipped by these modes through Canada's three major international gateways at Windsor, Sarnia and Niagara. The Niagara frontier gateway accounts for one-third of total Ontario-U.S. surface trade in 1999. Between 1995 and 1999, the value of exports through the Niagara frontier increased by 30% with tonnage increasing by 22%. Import growth was lower at 19%.

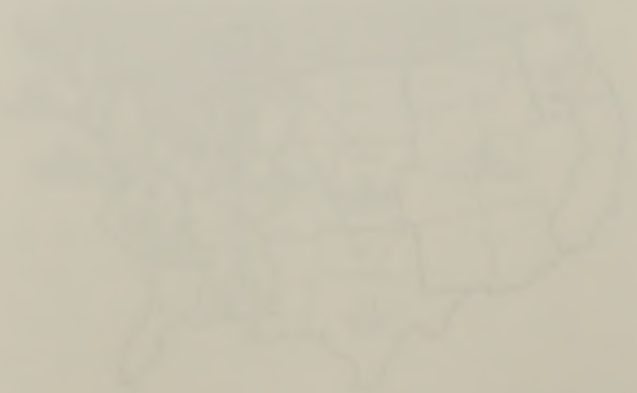
Ontario-U.S. Trade Flows. 1999 ($ Billions)

Source: Transport Canada

The total number of trucks crossing the Canada-US border rose at an annual rate of 7.4% between 1991 and 2000.

Trucks carried 54% of all automobile products (by value) shipped to the US, 80% of all machinery and equipment products and 88% of all food products.

Trade between Ontario and the US states bordering the Great Lakes accounted for about 30% of all trade between Canada and the United States.



Automobile products dominate Ontario's exports which go mostly to Michigan. In 1999 these exports totalled $53 billion of which 57% was carried by truck. Similarly, automobile products is a major component of Ontario's imports and trucking accommodated 90% of these commodities.

Goods transported by truck through the Niagara gateway in 1999 accounted for an estimated $35 billion worth of exports and $44 billion in imports. Rail freight amounted to $17 billion in exports and $8 billion in imports. While three-quarters of the goods are carried by truck, rail accounted for 32% of exports by value and 35% by weight.

International trade through the Niagara Peninsula and Ontario's other economic corridors is clearly vital to continued economic growth in the province as well as neighbouring jurisdictions in the U.S. While, more manufacturing jobs have been created in Ontario in the past five years than in any other jurisdiction in Canada or the United States, all regions stand to benefit.

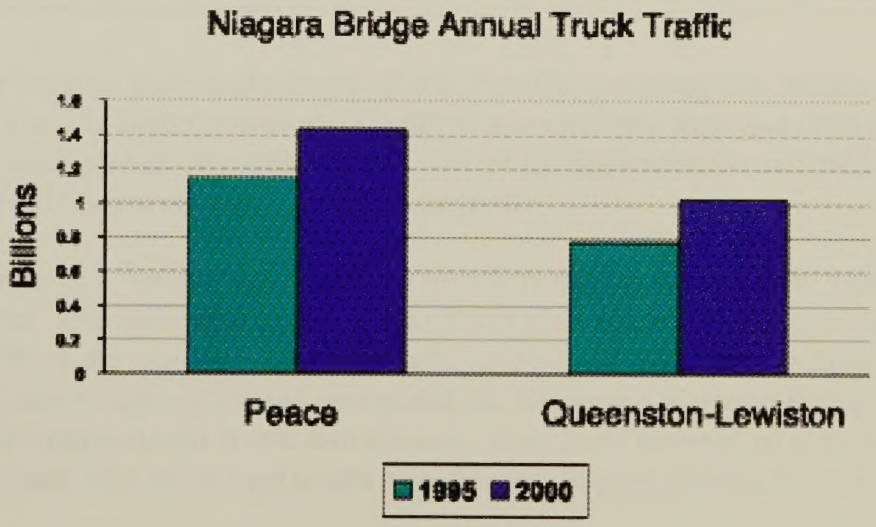
In 1999, the exports carried by trucks translates into nearly 1.4 million jobs on both sides of the border including 580,000 in Ontario and 160,000 in New York State, as well as another 31,000 in the rest of Canada and 600,000 jobs in the remainder of the United States.

The growth in international trade underlies the increase in commercial vehicle traffic at Niagara's two truck crossings: the Peace Bridge between Fort Erie and Buffalo; and the Queenston-Lewiston Bridge linking Niagara Falls, Ontario, and Niagara Falls, New York.

Over the period 1995 to 2000, truck traffic grew by 28% to 540,000 vehicles across the Niagara frontier. The Niagara crossings constitute 29 percent of all Ontario-U.S. commercial traffic and 77% of all vehicular traffic between Ontario and New York. Peace Bridge truck volumes rose by 26% to 1.4 million annually and Queenston-Lewiston Bridge truck traffic increased by 32% to just over 1 million.

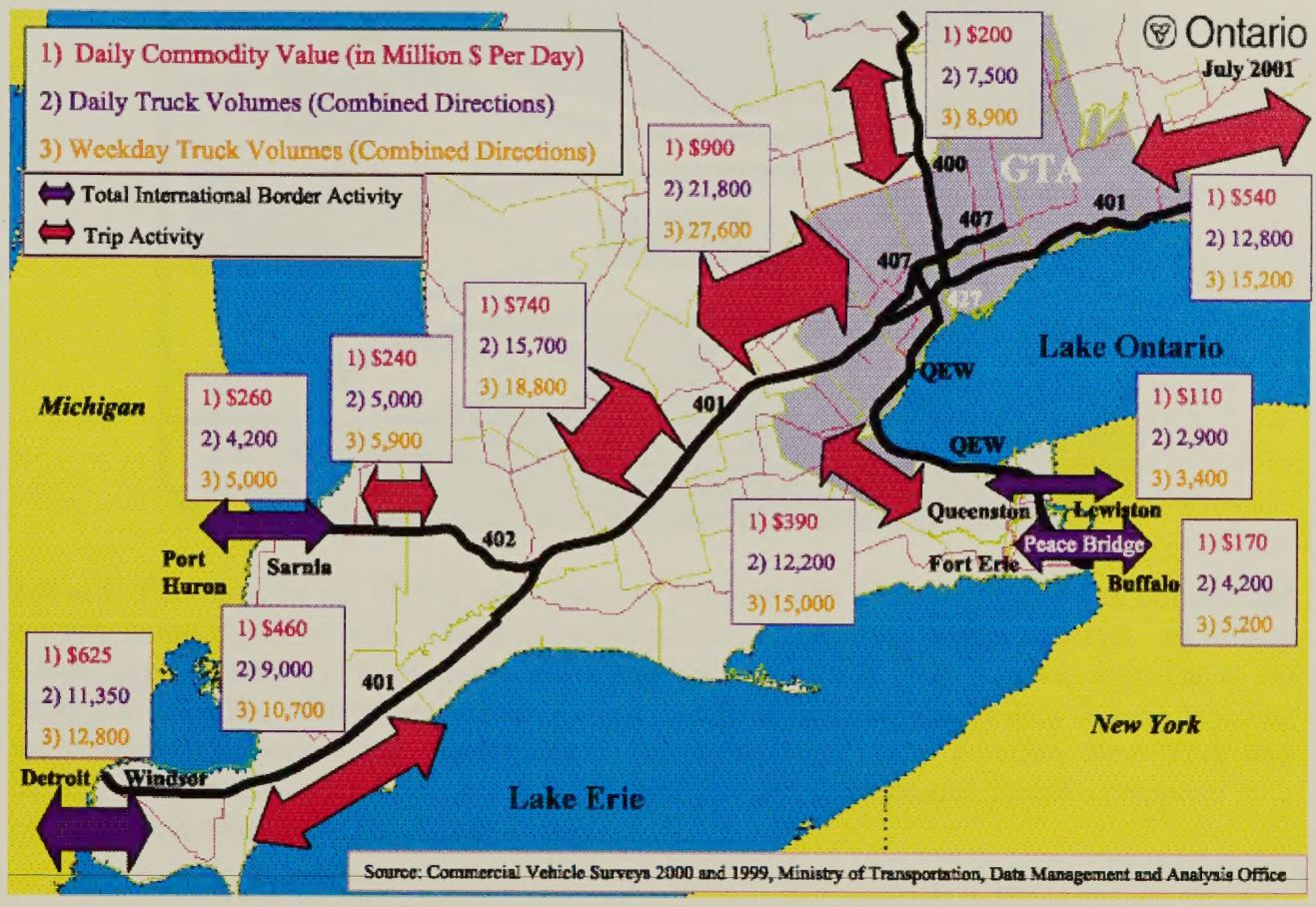
Based on the 1999 Commercial Vehicle Survey traffic counts, 7,100 trucks travel across the two Niagara bridges carrying $280 million in cargo per day (averaged over seven days).

On an average weekday, 8,600 trucks travel across the two bridges carrying an estimated $340 million in goods per weekday.



On the Queen Elizabeth Way (QEW), near Hamilton, some 15,000 trucks travel on an average weekday transporting $440 million in freight. The volume of weekly trucks on the QEW at this location is almost equal (90%) to truck traffic on Highway 401 at Windsor and Highway 402 at Sarnia.

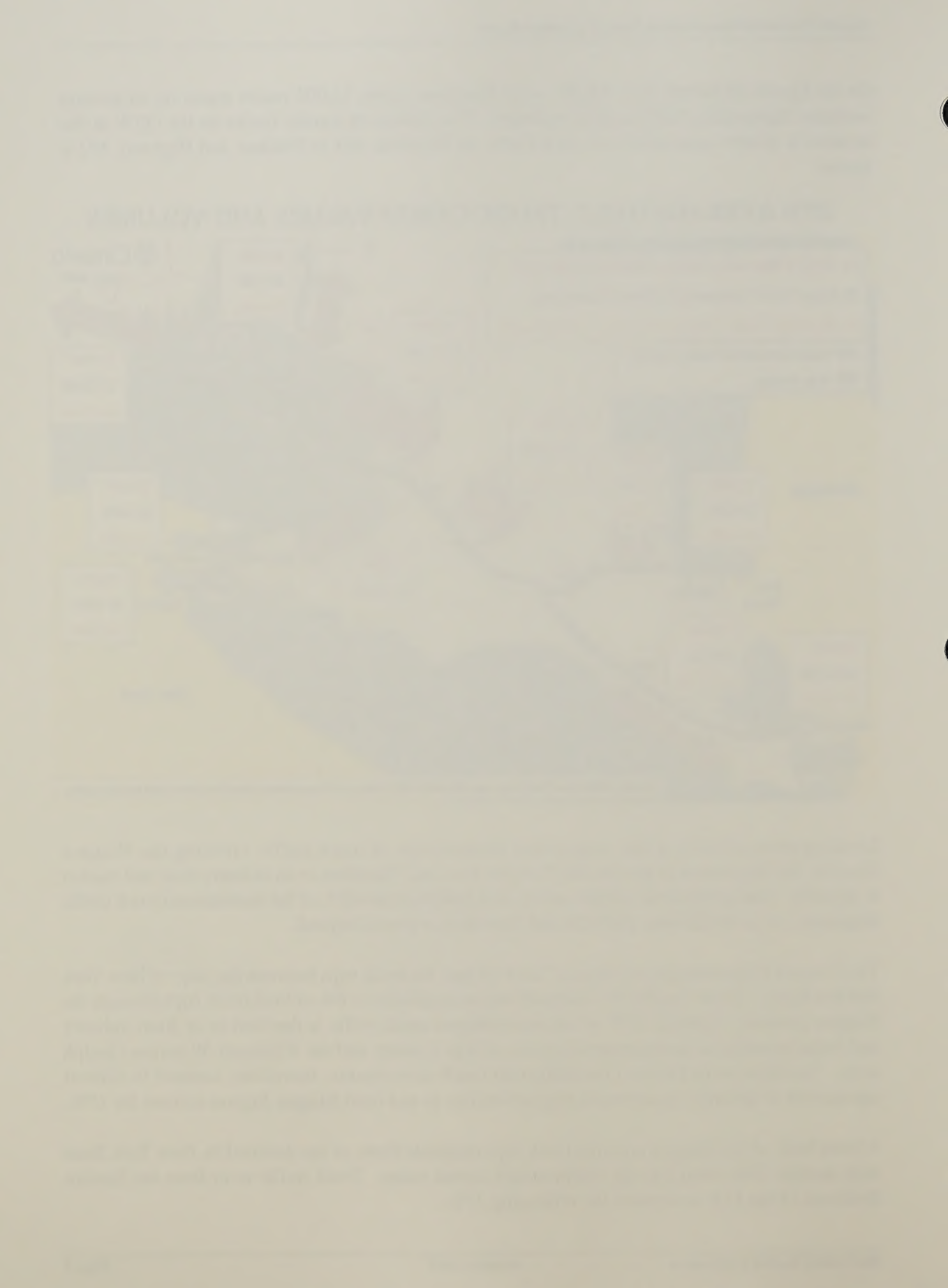
2000 AVERAGE DAILY TRUCK CARGO VALUES AND VOLUMES

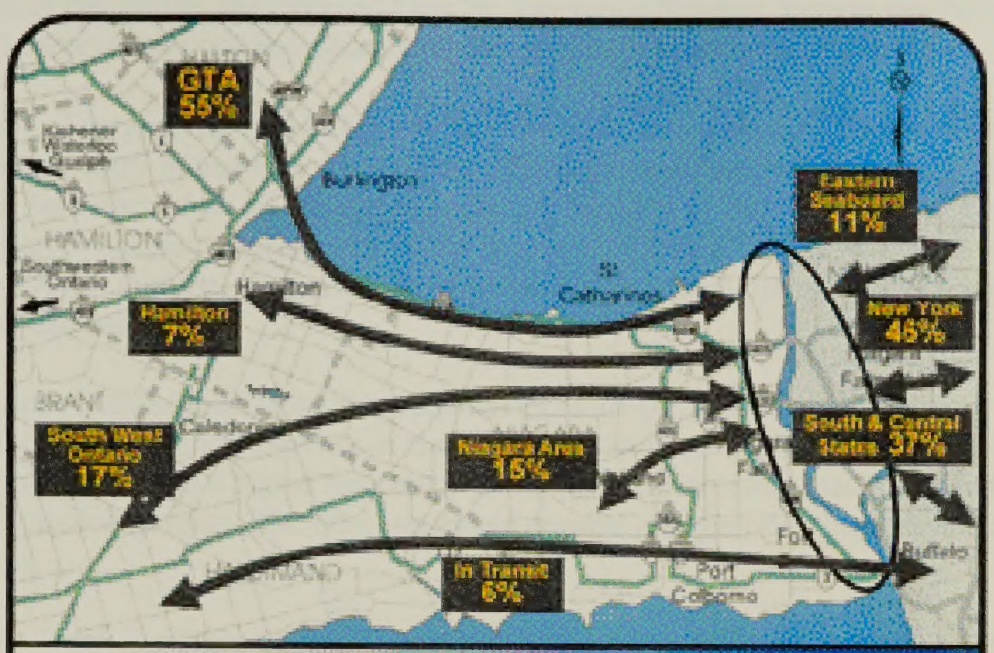


Looking more closely at the origins and destinations of truck traffic crossing the Niagara Frontier, the dominance of the Greater Toronto Area and Hamilton as an industry base and market is apparent. The commercial vehicle survey data indicates that 62% of the international truck traffic originates, or is destined to, the GTA and Hamilton or points beyond.

The Niagara Peninsula also serves as a "land bridge" for truck trips between the state of New York and Michigan. These "in-transit" international trips amount to 6% of total truck trips through the Niagara gateway. Another 17% of the international truck traffic is destined to or from industry and major markets in southwestern Ontario such as London and the Kitchener-Waterloo-Guelph area. Southwestern Ontario international truck movements, therefore, amount to almost one-quarter of the cross-border truck trips while trips to and from Niagara Region account for 15%.

Almost half, of the Niagara crossing truck trips originate from, or are destined to, New York State with another 37% related to the southern and central states. Truck traffic to or from the Eastern Seaboard of the U.S. comprises the remaining 11%.





Year 1999 Commercial Vehicles Crossing Niagara Gateway (Preliminary Results 1999 CVS)

Towards Hamilton on the QEW, truck volumes increase due to the industrial and commercial activity in the Hamilton area. The distribution of trucks, therefore, changes as well. At Stoney Creek, approximately 15% of trucks are Hamilton related and 55% of truck movements are through to the GTA. Almost one-quarter of truck travel is to or from southwestern Ontario including the Kitchener-Waterloo and Guelph area. In-transit truck trips between New York and Michigan represents 6%. Truck movements to or through southwestern Ontario comprise 30% of the truck traffic on the QEW near Stoney Creek.

2.2 Outlooks

Surveys and industry interviews suggest that the "Just-in-time" delivery method of inventory management will continue to predominate and will probably grow, particularly for short to middle-distance hauls. While rail will become more competitive with new and innovative technology such as “Road Railers” etc., the trend appears to be towards modal integration not competition. The challenge may be to maintain the current high rail mode share of 23%, although both CN and CP have announced new inter-modal terminals plus expansion plans. The retention of key rail lines and crossings and intermodal opportunities should be considered in the transportation development strategy for the Niagara Peninsula.

the important role of the Marine mode in moving goods across the Niagara Peninsula also need to be recognized. While Seaway traffic declined during the 1980’s before stabilizing in the 1990’s, shipping is vital in the low cost transport of low-value, high volume cargo such as salt, cement, iron ore, etc., thereby maintaining the competitiveness of major industries at Nanticoke, Hamilton and Buffalo. Although the Welland Canal may not be able to accommodate the larger ocean

going ships in the future, the canal and the St. Lawrence Seaway System can be expected to continue to serve certain oceanic connections, Great Lakes vessels and tourist ships.

Air transport of cargo is limited to high value, low bulk, time sensitive freight such as courier services, technology, biomedical goods etc. While the international airports in Toronto and Buffalo can be expected to be the major passenger airports in the future, Hamilton's John C. Munro Airport could play a greater role in the transport of specialized good as well as passenger services to smaller markets. Improved highway connections could substantially improve airport accessibility and use.

The truck mode is anticipated to be the predominant mode for "just-in-time" delivery of goods in support of industry throughout the Golden Horseshoe area and western New York state. Just-in-time delivery usually results in a higher frequency of shipments, decreasing lead times and reductions in the size of truck shipments. The effect on freight demand is to generally increase the total number of truck trips.

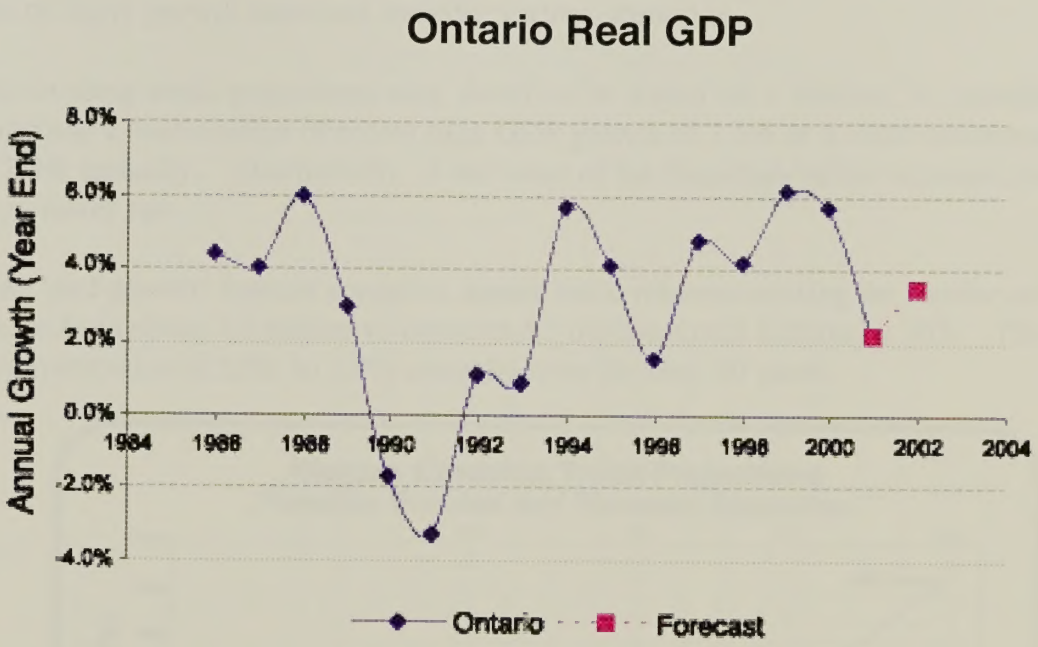
Other trends could also increase truck use in the future. Greater truck-rail intermodalism could reduce trucking over long hauls, but could actually increase the number of trucks distributing cargo off-loaded at intermodal stations. Greater reliance on e-commerce and other emerging trends could reduce the number of shopping trips but increase the reliance on trucking to ship goods directly to home. In addition, as noted earlier, the automotive sector is a major component of international trade with a high reliance on the truck mode.

International truck traffic through the Niagara Peninsula is anticipated to increase substantially in the future. The question is: how much will it grow over the next three decades? Clearly freight transport requirements are dependent on the volume of international trade between Ontario and the United States. The demand for Canadian exports depends primarily on U.S consumer demand and the price competitiveness of Canadian products.

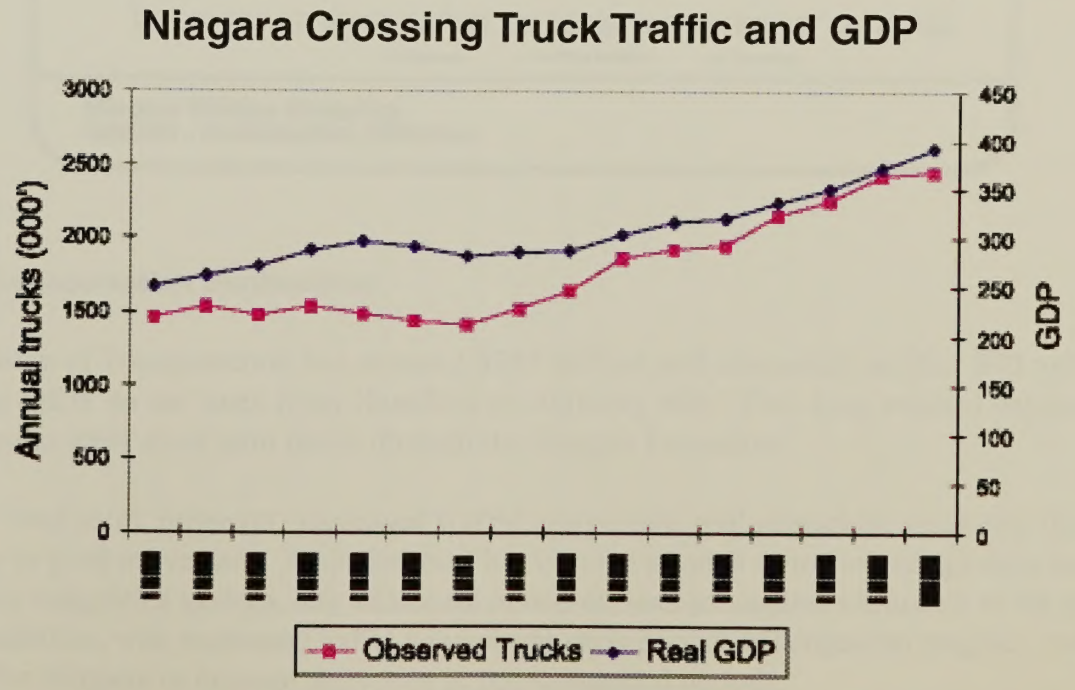
Strong U.S. consumer demand and the attractively priced Canadian dollar underlie the 8% annual growth in exports over the last decade. The American economy has been running at 4.3% growth annually through the 1990's while the Canadian economy has been growing an average of 3.8% (current $) per year. Economists generally believe that economic growth between 2.5 to 3.5% annually is sustainable, with higher rates achievable only over short durations. According to the May 2001 Blue Chip Economic Indicators, US economic growth is expected to accelerate from 2.0% in 2001 to 3.1% in 2002.

In response to softer U.S. demand for Canadian exports and higher interest rates, the Canadian economy has slowed considerably with GDP growth estimated to be 2.2% over 2001 and 3.0% in 2002.

The Ministry of Finance's planning assumptions, shown below, calls for real growth of 2.3% for 2001 and 3.6% for 2002,



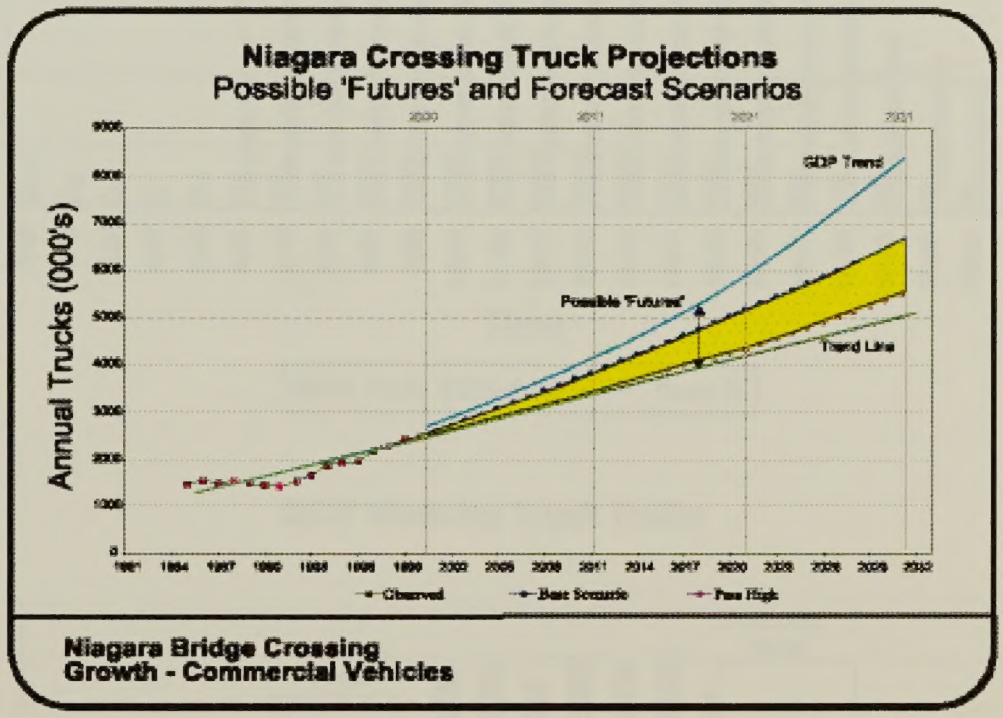
Niagara frontier international truck growth appears to be closely related to Ontario GDP growth over the last 15 years. Between 1985 and 2000, the Ontario GDP increased an average rate of 3.8% annually while truck traffic increased by 4.6% annually. Over this period, NAFTA and the removal of tariff barriers has facilitated Canadian-U.S. trade, but this structural change is now in place.



Clearly the forecasting of future truck volume growth and its relationship to the GDP is difficult and depends on a myriad of variables, including the economies of the two nations, the value of the Canadian dollar, the vibrancy of different sectors and trends in shipping modes. Consequently, from the point of view of good planning, it is necessary to carry out a sensitivity analysis of likely growth rates and consider various scenarios.

Niagara crossing truck projections may therefore be based on a number of "possible futures". These include a continuation of recent high GDP growth of 3.5% or a more conservative growth rate of 2.5% annually. Alternatively, if the value of the Canadian dollar increases, truck growth will be at lower rate.

Based on "mid-growth" forecast scenarios, annual truck volumes crossing the frontier are anticipated to increase from about 2.5 million to between 5.5 million to 6.5 million by 2031. This represents annual growth rates of 2.3% to 3.9% annually over the next 30 years.

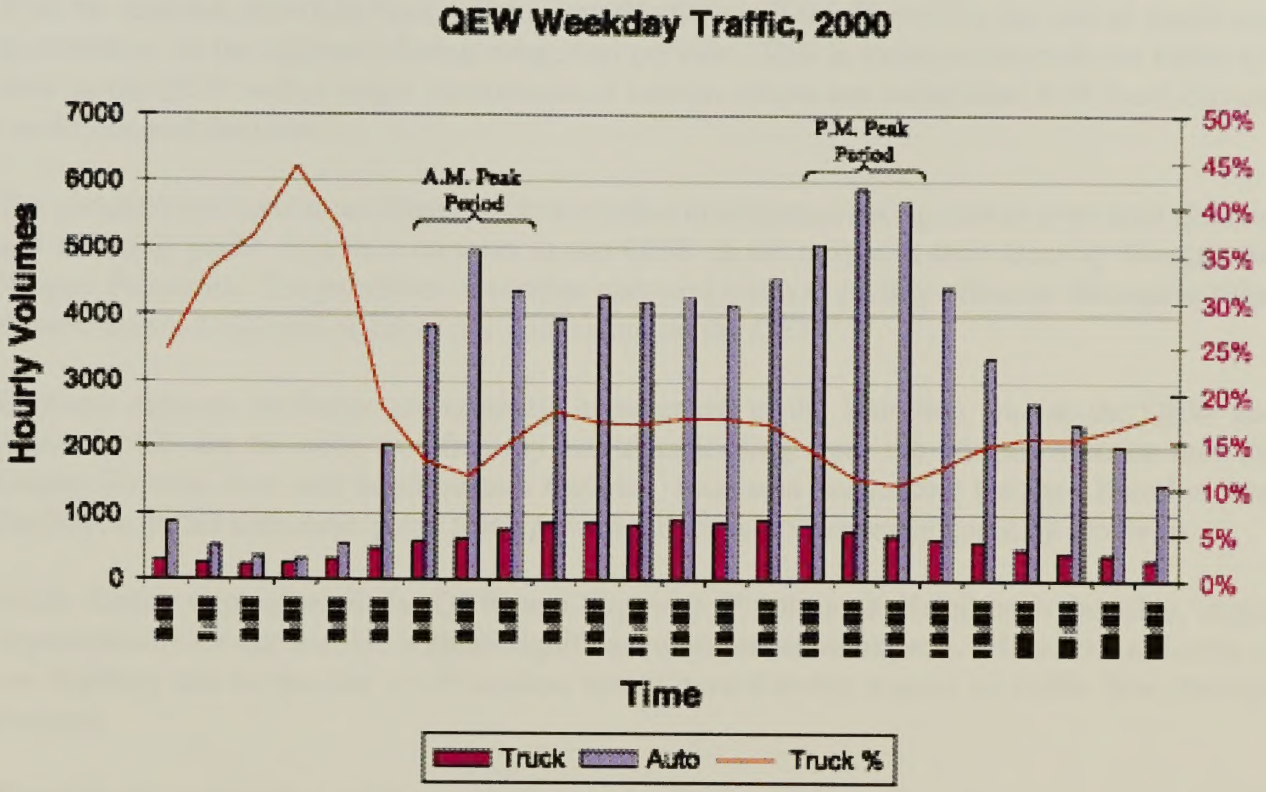


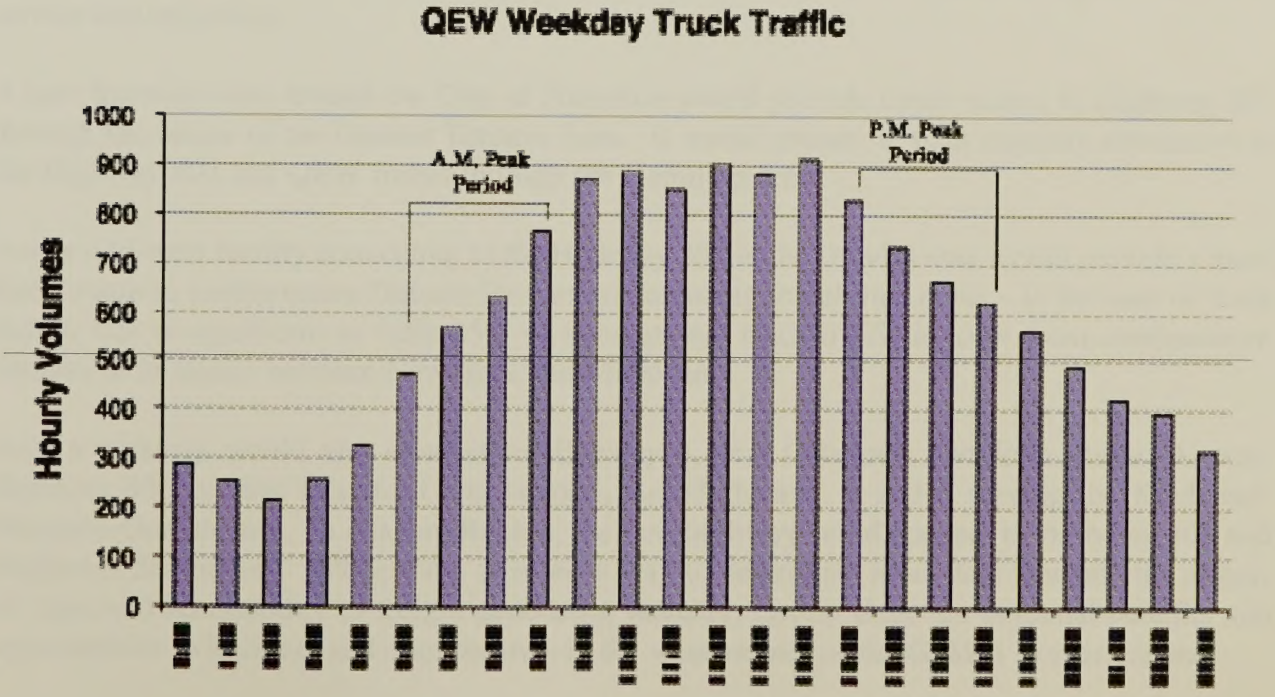
2.3 Transportation Implications

The Ministry of Transportation has invested $245 million and committed another $70 million to widen the QEW to six lanes from Hamilton to Highway 405. This long awaited expansion is anticipated to meet short term needs through the Niagara Peninsula.

Over the long term, however, increased traffic congestion will impact on truck trip time and reliability in good movement. While industry has become adept at trying to manage their business around key congestion periods, any additional transport costs are applied ultimately to the product cost. In addition, with increasing traffic volumes the daily periods of congestion lengthen making it difficult for shippers to manage deliveries in non-congested periods.

Based on traffic counts for the 1999/2000 Commercial Vehicle Survey, weekday truck traffic comprises 86% of overall weekly truck volumes. The average weekday truck share is 16%. Approximately 32% of weekday truck travel is during the three-hour a.m. and p.m. peak travel periods.





Analysis to date suggests that congestion delay costs related to trucks travelling through the peak travel periods could cost from $1.4 - $1.9 billion over the next 30 years if no improvements to the highway system are made through the Niagara Peninsula. These user costs translate into 1,300-1,800 lost jobs.

With the forecast growth in truck volumes, traffic flow will be affected by the mix of trucks and automobiles on the highway during congested periods. This is more problematic on highways such as the QEW with a major component of tourists whom are unfamiliar with local driving conditions and the route.

The possibility of serious accidents and bad weather conditions causing lane or even total closures and affecting traffic flow is a concern as the QEW is the only east-west freeway through the Niagara Peninsula. The provision of another east-west freeway facility offers an alternative route if there are road closures or excessive congestion on the QEW.

Highway capacity problems are currently experienced in the Hamilton area as the QEW and Highway 403 are the only two freeway corridors leading from the Niagara frontier into the Greater Toronto Area and Southwestern Ontario. Increased commuting between Hamilton and the GTA coupled with anticipated truck growth will exacerbate present capacity problems.

While further expansion of the QEW and Highway 403 through Hamilton is possible, major improvements are not feasible without significant environmental impacts. Moreover, a closure to one highway due to weather or an incident would have a severe impact on traffic flow through the area.

These issues suggest that, while some relief can be obtained from widening existing freeways, the possibility of a new route through the peninsula will have major potential advantages to levels of service and reliability.

A new freeway route around the City of Hamilton would provide direct access to Highway 407 through the centre of the Greater Toronto Area. It would present a high capacity alternative to the Highway 403 and QEW routes through the Hamilton area.

A new east-west facility connecting to the Highway 403 in the Dundas area would provide a more direct route to southwestern Ontario for carriers, reducing travel time costs. In the case of truck traffic, this is significant as fully 25% of international truck traffic is to or from southwestern Ontario or in-transit between New York and Michigan.

Such a highway would also connect to Highway 6, near Caledonia and John Munro Airport, Highway 403 serving Brantford and beyond, and Highways 8 and 6 serving the Kitchener-Waterloo-Guelph area. In Niagara Region, the new highway could connect to Highway 406 and Highways 58 and 140. While there is no easy way to determine, much less "model" the affects of improved accessibility to freight generating industry, clearly there are potential benefits and opportunities to business and communities in the western part of the Golden Horseshoe area.

There is also the potential for a new international trade corridor through the Niagara Peninsula into New York State. In the United States, a new north-south corridor (Route 219 or "Continental 1") has been proposed and a better linkage to the eastern U.S. seaboard is also seen as a critical need. It should be noted, however, that any new "mid-peninsula corridor" combined with the QEW actually offers two options to carriers within the Niagara trade corridor and industry in both countries. The added security, reliability and accessibility provides greater opportunity for bi-national industry integration, regional competitiveness, and economic growth.

Lastly, new and innovative Intelligent Transportation Systems (ITS) are being adopted around the world to more effectively manage traffic flow particularly for commercial vehicles. In the future, ITS could be used to improve the operation of the QEW, but there is also the opportunity to use new technology to manage the highway system as a whole. Freeway traffic management, driver warning systems, commercial vehicle processing on highways are possibilities. In the event that two freeways are provided through the Niagara Peninsula, ITS would be an asset to optimize highway usage.

3. TOURISM

3.1 Overview

The World Tourism Organization reports that tourism is the fastest growing industry in the world. Tourism is Ontario's fifth largest export industry employing in excess of 400,000 persons. In 1997, about 36,000 full-time jobs in Ontario were supported by tourism spending in Niagara; 30,000 of which are within Niagara comprising 19 per cent of local employment.

Tourism related spending in Canada amounted to $47 billion in 1998. Ontario tourism accounted for $11.5 billion, representing one-quarter of all Canadian tourism expenditures. Some $2.1 billion was spent in Niagara Region which is comparable to the $2.8 billion spent in the Toronto area. Hamilton, while not a major tourism centre, still attracted some $260 million in tourism expenditures.

Niagara is Ontario's primary tourism gateway with 50 percent of all tourists entering the province via the international crossings. Over 90 per cent travel by auto. Currently annual visitation is in the range of 14-15 million focused largely on Niagara Falls during the summer (July, August, September).

The Niagara Falls area is a world recognized tourist destination. The area is also uniquely positioned in that it is on the U.S. border and within a comparatively short drive of a large U.S. market that can take advantage of the low Canadian dollar.

The historical attraction of Niagara Falls has been bolstered by the addition of the interim Casino in December 1996. A major expansion of the existing 13,600 hotel rooms in Niagara Falls is also under way.

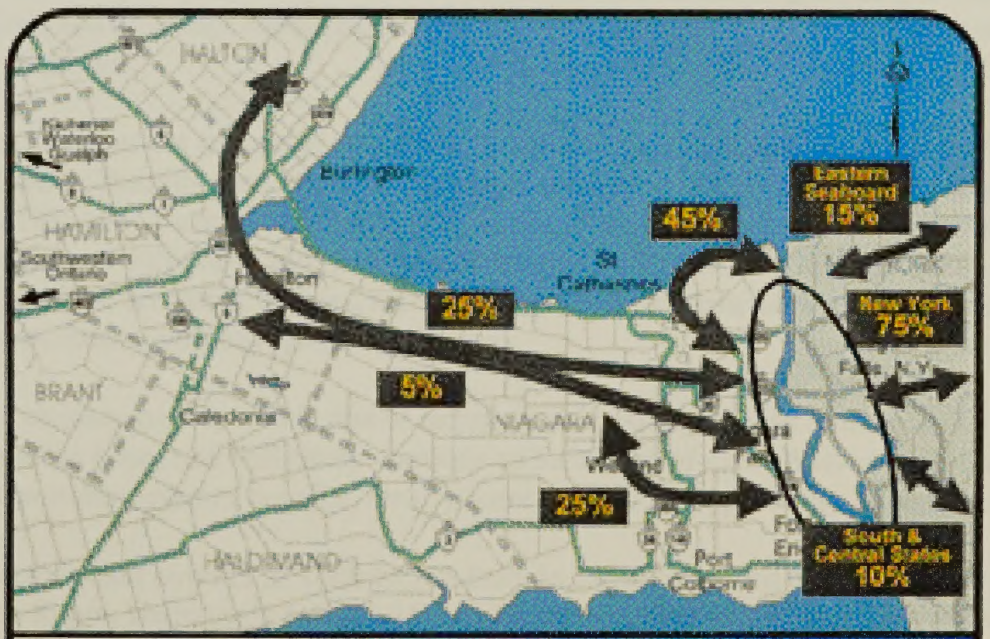
While only 22% of all U.S. visitors to Niagara stayed overnight; this number has been increasing since the opening of the Casino. Overnight stays are very important in terms of generating tourism expenditures and job creation.

Niagara Falls is also located in close proximity to the Greater Toronto Area and most of the major population centres in southern Ontario. Domestic tourism travel to the Niagara area is significant. Indeed, during the summer months, while currently 53 percent of visitation is from the U.S., the remaining 47 per cent is from the west, largely via the QEW.

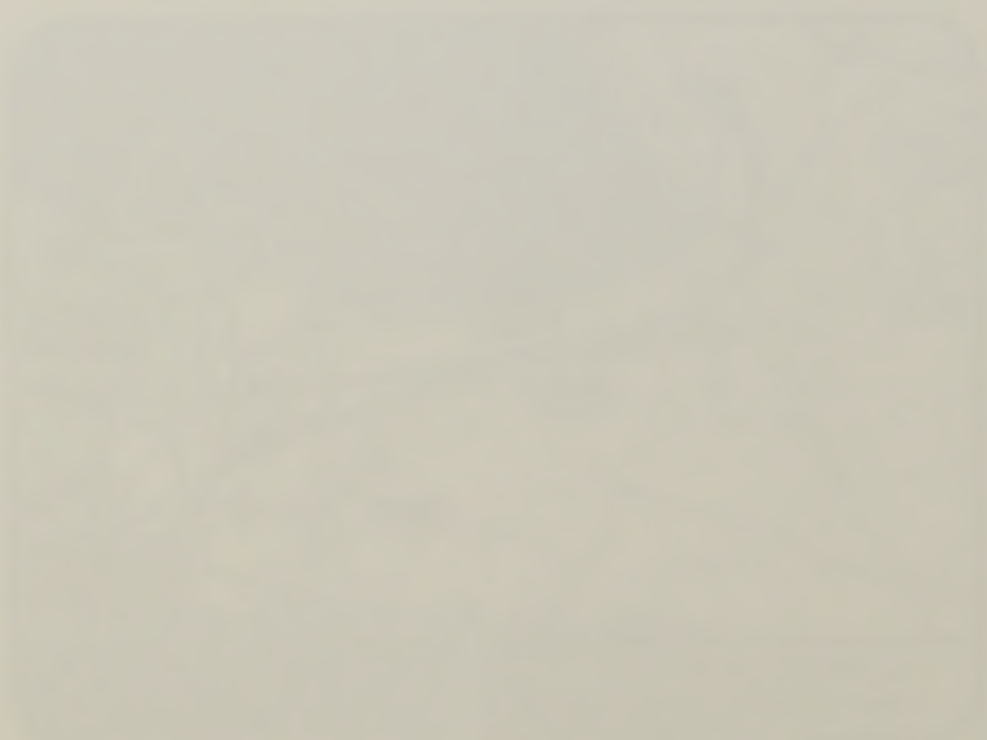
Toronto with its big-city tourist attractions is within a two hour drive of the Niagara crossings, and hence, American to tourists. Annual visitations to the Toronto area are about 16.5 million. Close to 20% of all tourist visitors to Toronto arrive by auto through the Niagara Peninsula (mostly from the U.S.). With major potential investment in the revitalization of Toronto's waterfront, this level could grow substantially in the future.

The Regional Municipality of Niagara, in co-operation with the Greater Buffalo and Niagara Transportation Council, the Province of Ontario and New York State carried out a bridge crossing survey in summer of 2000. This major survey recorded the travel characteristics of passenger vehicles crossing the four international bridges. The results indicate that 45 per cent of U.S, travelers were destined to the Niagara Falls and Fort Erie areas. This reflects the importance of these areas as tourism destinations. Another significant 25 percent, however, were destined to rest of Niagara which suggest that the regional attractions - the vineyards, harbours, Welland Canal and community activities are vital to tourism and the economic growth in the area.

While only 25 per cent are destined to the Greater Toronto Area, Hamilton or points beyond, these tourists travel through the Niagara Peninsula on the QEW. The QEW is therefore an important tourism, as well as international trade corridor into Ontario.



Year 2000 Passenger Vehicles Crossing Niagara Gateway



3.2 Outlooks

The international crossings and the QEW are critical to the movement of tourists in and through the Niagara Peninsula. Since tourist travel is generally discretionary, highway congestion and safety concerns will discourage visitation to the Niagara and Toronto area. This could have severe impacts on the tourism industry and would not allow Ontario to realize its full tourism potential. "Repeat visits" is clearly a major factor in the sustained health of the tourist industry. Given the discretionary nature of tourist trips it has been shown that a poor travel experience can seriously impact the likelihood of a traveler making a repeat visit.

With the largest number of visitation largest during the summer months and on weekends, there would appear to be potential benefits associated with a tourism train service operating between Toronto and Niagara Falls. Whether this would be an upgrade of current VIA service or a new operator, this opportunity should be considered by the Niagara Region in the future. Within Niagara Region, the Trillium Railway has initiated a short line tourism train between Port Colborne and St. Catharines, and the City of Niagara Falls is working towards a People Mover system.

Passenger rail service could play a strong role in supporting tourism growth in Niagara Region but it would likely focus on weekend travel and not significantly alleviate weekday congestion on the highway system. However, this option would provide choice to travellers and reduce some highway travel during the peak tourism season. As in the case of rail freight transport, the retention of key rail lines and crossings should be considered in the transportation development strategy for the Niagara Peninsula.

Marine transport does not presently play a role in the movement of passengers from the Niagara area to the Greater Toronto Area. Previous attempts at running largely high speed passenger ferry services from the Niagara area to Toronto proved not to be financially viable. Another service, however, has just recently been initiated from Rochester to Toronto. While a possible option for future consideration, service schedules, the need for access, unpredictable weather conditions and the short tourist season will always be challenges.

An emerging tourism growth area is that of international passenger ships touring the Great Lakes. Port Colborne has been, and will likely continue to be, a port-of-call. While tourist ships do not provide transportation system benefits, clearly there is a tourist opportunity to be realized.

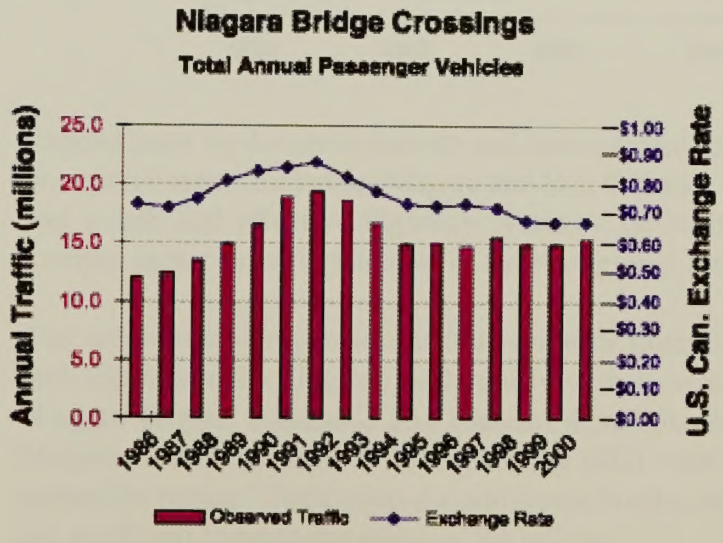
While the international airports in Toronto and Buffalo can be expected to be the major passenger airports in the future, Hamilton's John C. Munro Airport could play a greater role in the provision of passenger service to secondary markets. Improved highway connections could substantially improve airport accessibility and use over the long term. In the short to mid-term, there remains a need for an efficient and reliable highway system to permit business and tourist travelers to access the international airports by automobile or express bus services.

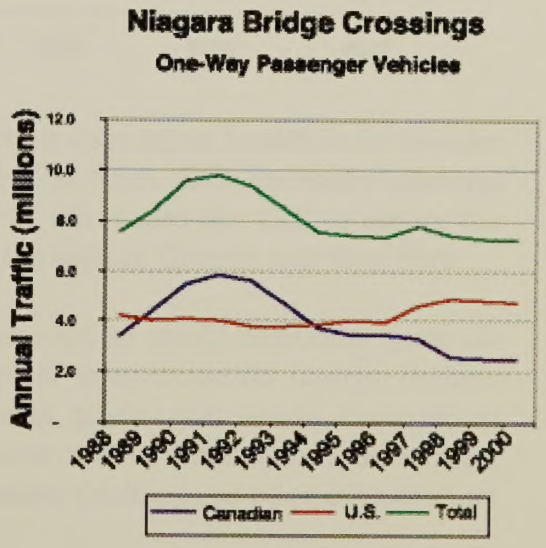
The automobile is anticipated to continue to be the principal mode for tourist travel in the future. Personal autos offer the flexibility of time and destination that cannot matched by other modes. It should be noted, however, that on a tourism or recreational trip, a car often carries three or more passengers plus their baggage and, therefore, are being much better utilized than in the case of the typical commuter trip.

International passenger vehicle traffic through the Niagara Peninsula is anticipated to increase substantially in the future. The question is: how much will it grow over the next three decades? Past trends suggest that Canadian cross-border tourists and shoppers are highly dependent on the value of the Canadian dollar. In contrast, U.S travelers appear not to be affected by the valuation as the price differential is generally in their favour. Generally, however, cross-border shopping traffic only impacts the transportation system at or in the general vicinity of the border: it has limited implications on longer distance trips.

While a slight increase in annual American travel to Niagara Falls can be attributed to the opening of the interim casino in 1996, the decrease in Canadian cross-border travel has negated any significant increase. Indeed, total bridge crossing passenger traffic has not yet come back to levels experienced in the early 1990's when the Canadian dollar was around $0.90U.S. The falling Canadian dollar clearly has an affect on the propensity for Canadians to vacation and shop in the United States.

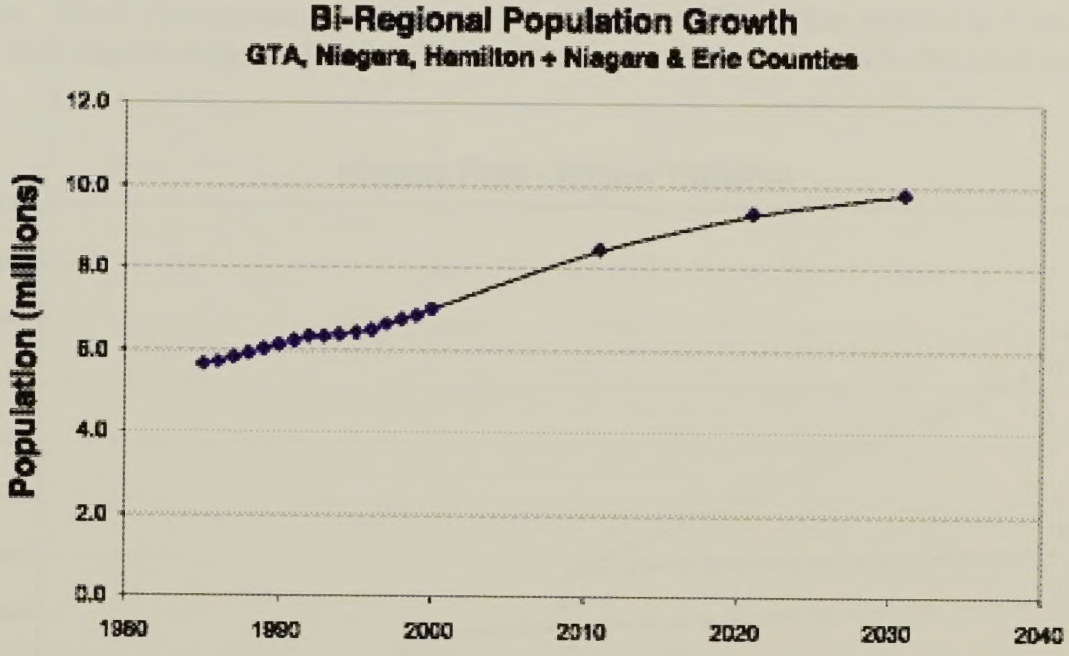
With a high Canadian dollar value, a greater number of Canadians are attracted to the U.S.: during the early 1990's, approximately two-thirds of the cross-border traffic was Canadian. By the year 2000, the Canadian dollar had decreased to $0.67U.S. resulting in four million fewer Canadian vehicle trips to the U.S. American vehicles presently comprise two-thirds of all cross-border passenger vehicle traffic.





Another key factor is the tourism market. A large number of American travellers (75%) currently come from New York state. New York, however, like many north-eastern states is not growing. Population projections indicate that the entire state of New York will only gain an additional one million people over the next twenty-five years. Within the Counties of Erie and Niagara across the border, population growth is anticipated to be minimal.

On the other hand, the Greater Toronto Area is projected to grow by an additional 3 million people over the next 30 years. Herein lies the potential for huge growth in the tourism market. A low valued Canadian dollar will continue to discourage Canadian travel to the U.S. Thus, any intervening tourism opportunities in the Niagara area, Toronto or the rest of the province could take advantage of this domestic market potential.



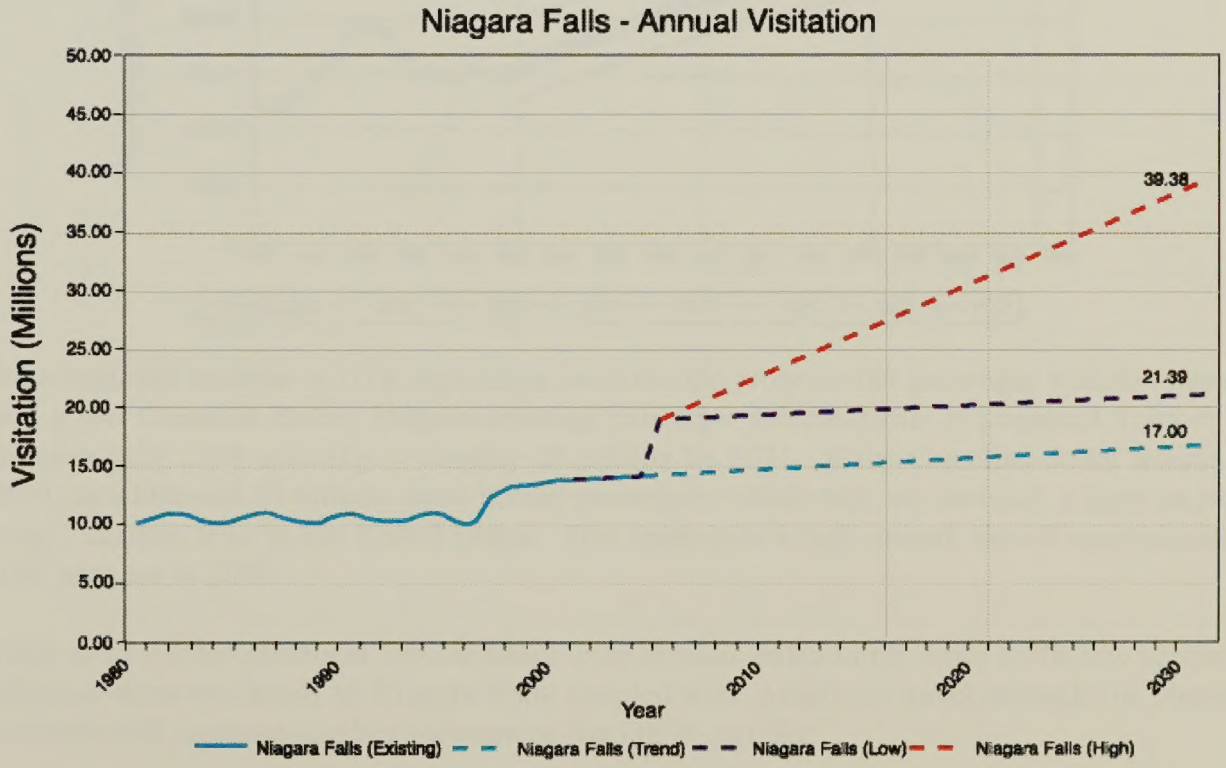
Expenditures by domestic tourists and international tourists have a strong net benefit to the broader bi-regional area – including Niagara and Erie Counties in New York State. Efficient border crossings and a safe and effective highway system – on both sides of the border are vital to realize the tourism sector growth potential in the bi-regional area and throughout Ontario and New York.

The creation and expansion of tourism attractions is fundamental to attract additional domestic and international visitation, particularly with increasing global competition for tourism dollars. Niagara Region economic and tourism development agencies predict that annual visitation to Niagara could reach 30 – 40 million by 2021 with extensive tourist infrastructure investment across the region. Total costs for additional hotels, entertainment facilities and other infrastructure are predicted to be in the order of $3 billion.

In addition to the Niagara Falls area itself, other tourist attractions are being developed in the Peninsula. A significant tourism and business activity relates to the wine industry and the unique fruitlands below the escarpment. The wine industry is finalizing a 20-year strategic plan that envisions growth from $350 million in domestic wines sales today to $1.5 billion in sales by 2021. With spin-off economic development, it is estimated that 10,000 new jobs could be created.

This level of investment, however, is clearly speculative and cannot be used as the sole basis for need and justification for transportation facilities or other public infrastructure. It is, nonetheless, beneficial to consider the potential for transportation improvements to support tourism development and economic growth as one component of an overall transportation needs assessment.

In view of the need to consider both realistic tourism trends, as well as the full tourism potential in the Niagara area, international crossing and highway forecasting is based on a scenario approach. Both a conservative tourism growth scenario of 21 million tourists to Niagara Falls and the high tourism target of 30-40 million visitors annually are assessed in this need assessment study.

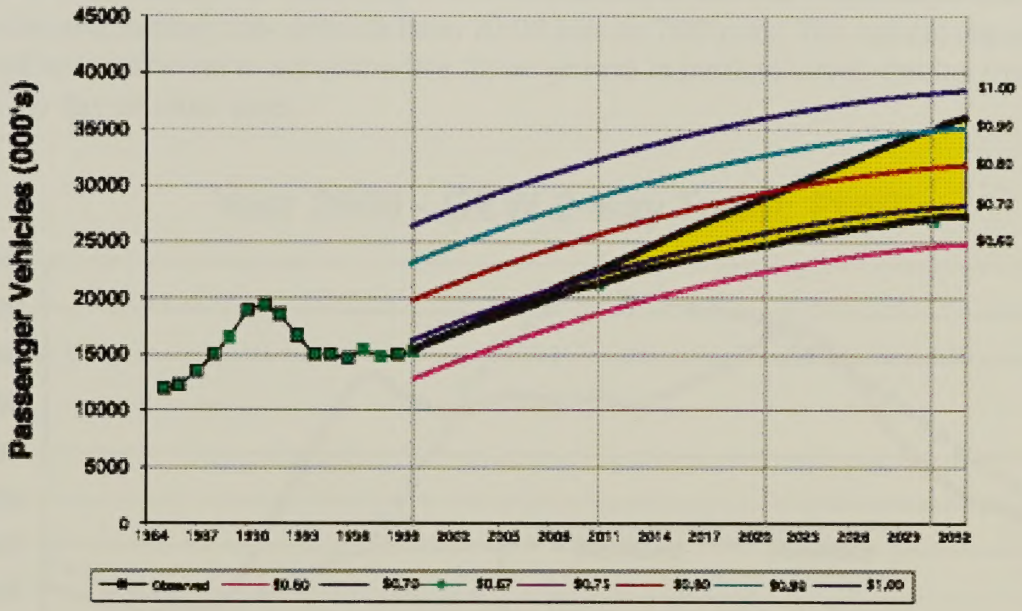


It may be observed that visitation to Niagara Falls increased by about four million in the late 1990's due largely to the opening of the interim casino in 1996. Projecting this level of tourism to 2031 results in some 17 million visitations annually to Niagara Falls. The planned permanent casino would attract greater visitation in the future - a possible 21 million persons by 2021. To achieve the 30-40 million target would appear to be very challenging both in terms of the investment in tourism infrastructure (hotels, theme parks, etc.), but also transportation infrastructure required for tourists and workers to travel to and around the Niagara Falls area.

As cross-border passenger vehicle traffic has been shown to vary substantially on the basis of the value of the Canadian dollar, various "possible futures" based on different exchange rates must also be considered along with the tourism scenarios.

Lastly, the international crossing and highway forecasting should consider the growth in tourism travel related to the increase in population for the bi-national region – the GTA, Niagara and Hamilton and the Counties of Niagara and Erie.

Niagara Crossings Passenger Vehicle Forecasts



The substantial increase in GTA population underlies the cross-border passenger vehicle forecast. With a low Canadian dollar, Niagara crossing passenger vehicle traffic is projected to grow by approximately 2.0% annually to roughly 28 million by 2031. If the Canadian dollar returns to $0.90, an additional 10 million cross-border passenger vehicle trips are forecast, a large number being Canadian trips to the United States. This represents a high growth rate of approximately 3.0% per year to 2031.

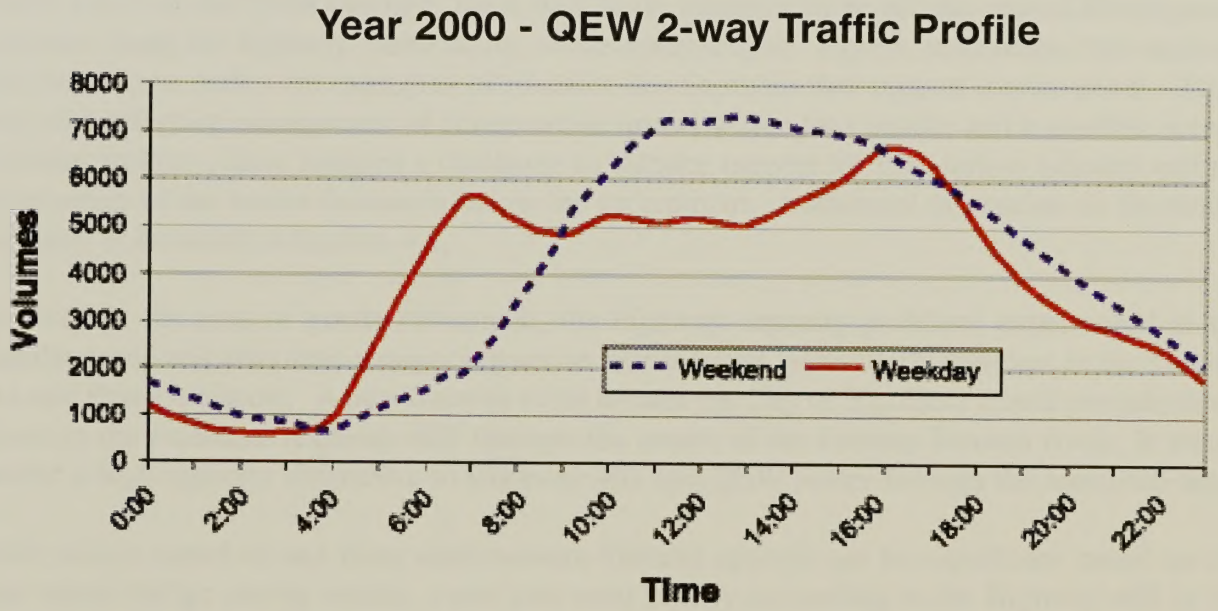
While cross-border passenger vehicle traffic may be anticipated to be closer to the low scenario, increased domestic travel to Niagara Falls coupled with American travel through the Niagara Peninsula will continue to place pressure on the QEW corridor.

3.3 Transportation Implications

The QEW is presently the key tourism route through the Niagara Peninsula between the GTA and Niagara Falls. While the expansion of the QEW to six lanes will meet the short term travel needs, future traffic congestion will have a negative impact on tourism travelers and ultimately the tourism industry. With tourist travel these impacts are not only related to normal congestion issues but also to a traveller's perception of the trip itself and the resulting likelihood that repeat visits will be curtailed.

While tourism travel is largely discretionary and therefore more likely to be shifted to off-peak periods than commuter and commercial travel, weekend travel on the QEW during peak seasons is already onerous on the traveller. The presence of a large proportion of large trucks and international tourists unfamiliar with the route add to the frustration of traffic congestion. Many tourist organizations (such as the CAA/AAA) recommend tourist routes that avoid corridors with high components of truck traffic

Traffic counts undertaken as part of the 1999/2000 Commercial Vehicle Survey indicated that trucks comprise 16 per cent of traffic flow on the QEW at Stoney Creek on weekdays and 6 per cent of the traffic volumes on weekends. Most interesting is that the weekend period, averaged over Saturday and Sunday now extends from 10:00 a.m. to 7:00 p.m. The current capacity of the QEW would be insufficient to accommodate future growth in tourism travel, forcing trips to other periods of the day or other days.



As the QEW is the only east-west freeway through the Niagara Peninsula, traffic incidents have a major impact on traffic flow, particularly during the weekend peak travel periods. During major traffic disruptions, vehicles divert to local roads which has significant impact on small communities.

It should be noted that the close proximity of the Niagara escarpment, coupled with urban development do not permit any alternative parallel route alternatives other than mainstreets and discontinuous service roads. While these incident events may not be more than a few weekends a year at present, over the next 30 years they could be a much more common occurrence as a result of increased traffic volumes.

The provision of another east-west freeway facility offers an alternative route if there are road closures or excessive congestion on the QEW for long distance trips from the GTA through to the United States. However, as Niagara Falls will be the major attraction, the QEW will continue to be the key tourism corridor. Indeed, if the high tourist visitation levels were achieved, substantial additional demand would be placed on the QEW corridor. The likely increase in tourist travel related to growth in the GTA would clearly benefit from improved capacity and trip reliability throughout the peninsula.

While an alternative route would divert truck traffic and some long distance tourist travellers, the QEW can still be anticipated to be congested in the future. QEW expansion – full or partial, a Highway 420 extension, adoption of ITS, in addition to a second east-west controlled access facility require consideration.

Given the tourism growth anticipated in the Niagara area and the expected increase in tourism related travel in the QEW corridor, there will likely continue to be tourist related development pressures along the highway, particularly, at the interchanges. Hotels, restaurants, rest stations, wineries, theme parks, are examples of roadside development that support tourist travel. Thus, even with effective management of future urban sprawl within the corridor and a possible second east-west freeway, there remains a challenge to balance support for the tourism industry and the preservation of the tender fruitlands below the escarpment. Additional discussion on the tender fruitlands is included in Section 4.2.

As noted in the case of goods movement, the highway capacity problems experienced in the Hamilton area will also have a major impact on tourist travel, particularly travelers to the Toronto area and Pearson airport. A new freeway route around the City of Hamilton would provide direct access to the extended Highway 407 through the centre of the Greater Toronto Area. It would present a high capacity alternative to Highway 403 and QEW routes through the Hamilton area.

While tourist travel to and from southwestern Ontario appears not be significant based on the most recent bridge survey results, a new east-west facility connecting to the Highway 403 in the Dundas area would provide a more direct route to southwestern Ontario. The affect on tourism cannot be quantified, but there is market potential over the long term

In Niagara Region, the new highway could connect to Highway 406 and Highways 58 and 140 which would provide two direct routes to Port Colborne and Highway 3 serving the Lake Erie waterfront communities.

As in the case of commercial traffic, new and innovative Intelligent Transportation Systems (ITS) can be adopted to more effectively manage traffic flow, but also promote traveller comfort and awareness which would support a positive tourist experience. Traffic/incident management systems and driver messaging/direction systems on key provincial highways, municipal roads, international crossings and U.S. roadways could play a key role in the future. In the event that two freeways are provided through the Niagara Peninsula, ITS could optimize roadway usage and promote tourism by increasing the likelihood that a traveler will experience a congestion-free and incident-free trip.

The four Niagara international road bridge crossings plus the additional capacity proposed between Fort Erie and Buffalo, should provide sufficient road capacity to accommodate projected growth in cross-border travel. However, it is essential for a positive tourism experience to maintain an efficient traffic flow through improved customs and inspection processing. This is an issue that both the Niagara Falls Bridge Commission and the Peace Bridge Authority are currently taking steps to address.

Intelligent Transportation Systems and technology, vehicle pass programs (i.e. CANPASS or Customs Self Assessment – CSA, for major carriers), additional staff resources and improved primary and secondary inspection facilities and operations will be required to minimize cross-border delay, particularly, during high tourist travel periods.

Highway 405 connecting the Queenston-Lewiston Bridge and the QEW on the approaches to the Peace Bridge are expected to function adequately well into the future. However, the Rainbow and Whirlpool Bridges enter the congested downtown core of Niagara Falls. Increased tourism by auto will continue to place pressure on the local/regional road system within the city. An enhanced "People Mover" transit system has been proposed to enhance tourism while reducing auto traffic on the Canadian side at Niagara Falls.

A potential new east-west freeway through the Niagara Peninsula connecting to New York State would provide a new corridor serving long distance travel between the U.S. and Central Ontario. However, a key consideration would be the ability for tourists to travel easily through New York state. A new north-south corridor (Route 219) has been proposed and a better linkage to the eastern U.S. Seaboard is also seen as a critical need.

Co-ordinated transportation planning between the various bi-regional agencies would ensure the viability the international crossings, connections and highway systems in support of tourism and goods movement on both sides of the border.

4. LAND USE AND DEMOGRAPHICS

4.1 Overview

Population growth tends to lead to greater development and infrastructure pressures. The Province of Ontario recently announced a "Smart Growth" strategy, a key aspect of which is to manage development in support of economic growth while considering the quality of life and protecting the environment.

The Regional Municipality of Niagara has recognized the importance of developing a transportation system that encourages land use and economic development south of the escarpment to alleviate urbanization pressures on the tender fruitlands along the QEW corridor. Adequate development capacity currently exists in existing designated urban limits of communities south of the escarpment. Niagara Region has initiated a regional transportation strategy initiative to study how the transportation system can be developed to support and shape future development and promote economic growth in the area.

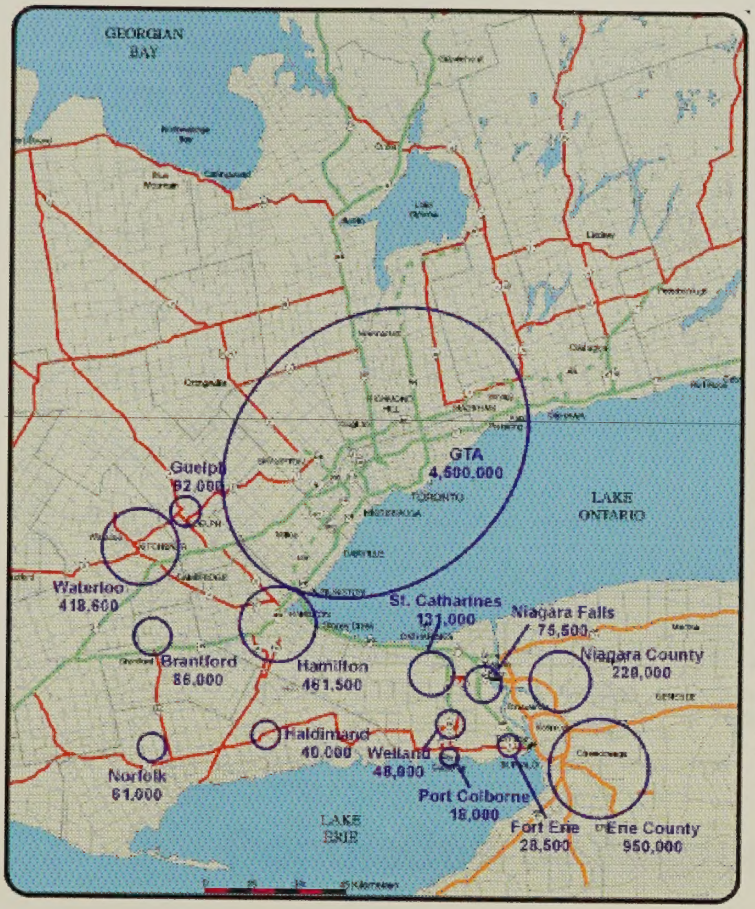
Hamilton-Wentworth Region considered the importance of integrated transportation and land use planning in its Vision 2020 planning study. The new City of Hamilton is now undertaking an Official Plan review process as part of the recent amalgamation of the six former local municipalities. With substantial growth already taking place south of the escarpment and the proposed development in the vicinity of John C. Munro International Airport, the City of Hamilton is also considering how the transportation system can be developed to support and shape future development and foster economic growth.

The conventional transportation planning practice is to develop the transportation system around today's and foreseeable needs in the future. This needs assessment study goes beyond addressing just travel demand needs and takes into consideration the potential of a future transportation network to support economic and land use policy and objectives of the province and regional planning agencies.

In previous sections, the significance of international trade, goods movement and tourism have been discussed. In this section, the growth of population and employment and the ensuing increase in commuting are considered. In addition, the potential for the Region of Niagara and City of Hamilton to realize greater population and employment growth and the land use and transportation implications are discussed.

The Region Municipality of Niagara is comprised of 12 local municipalities with a total population of approximately 425,000 in 2000. The new City of Hamilton is comprised of the original six local municipalities and now totals approximately 500,000 persons. In Niagara Region, the major population centres are clustered along the QEW and Highway 406. The QEW corridor below the escarpment contains approximately 235,000 people between Hamilton and St. Catharines (includes Stoney Creek, Grimsby, Lincoln and St. Catharines). The Highway 406 corridor running from St. Catharines south to Port Colborne (includes Thorold, Welland and Port Colborne) accounts for over 90,000 persons. The border cities of Fort Erie / Buffalo and Niagara

Falls (Ontario) / Niagara Falls (New York) total approximately 475,000 forming a significant bi-national region.



Existing Population

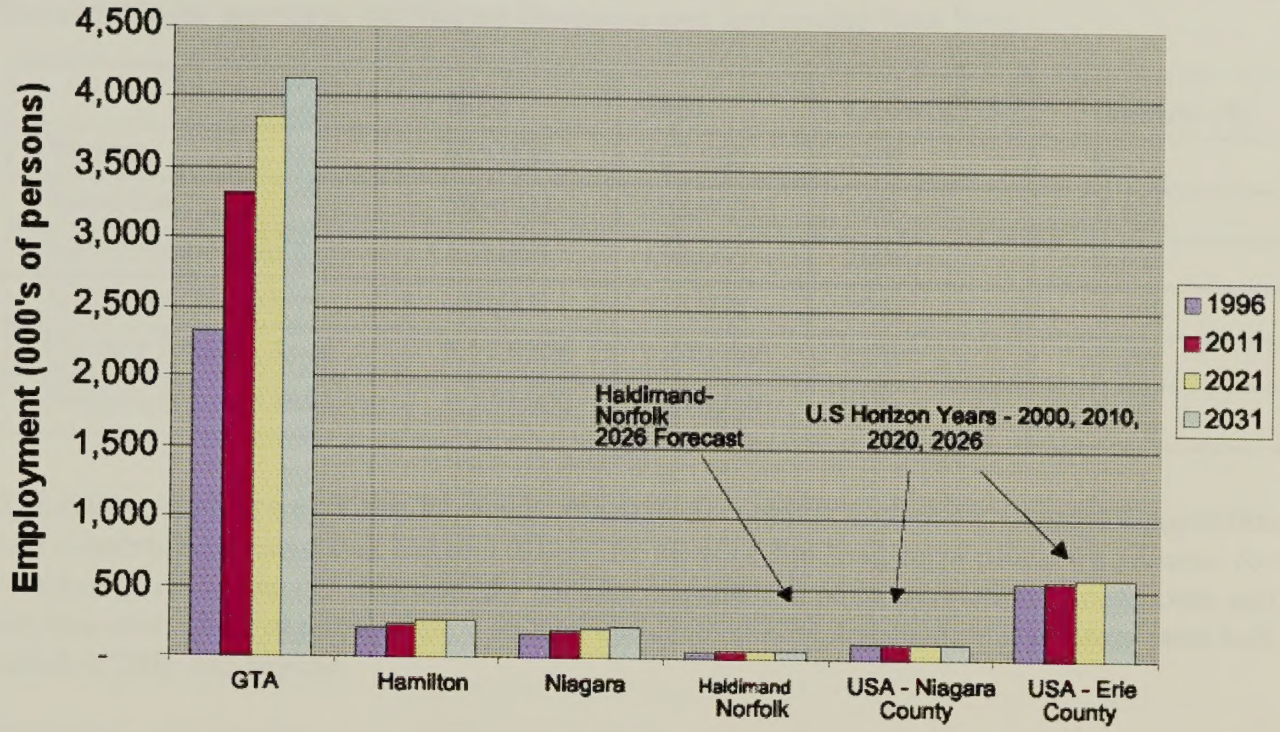
Looking more broadly, the Counties of Erie and Niagara in New York State, including Buffalo and Niagara Falls total 1.2 million people. These counties have experienced limited economic growth over the last decade and together with Niagara Region and Hamilton are looking for ways to stimulate economic development.

Over the last 20 years, population and employment growth in Niagara, Hamilton and Haldimand-Norfolk has been slow compared to the Kitchener-Waterloo area and the Greater Toronto Area (Halton, Peel, York, Toronto, Durham). In the case of Niagara and Erie Counties in New York State, the population has actually declined by 6% from 1980 to 2000.

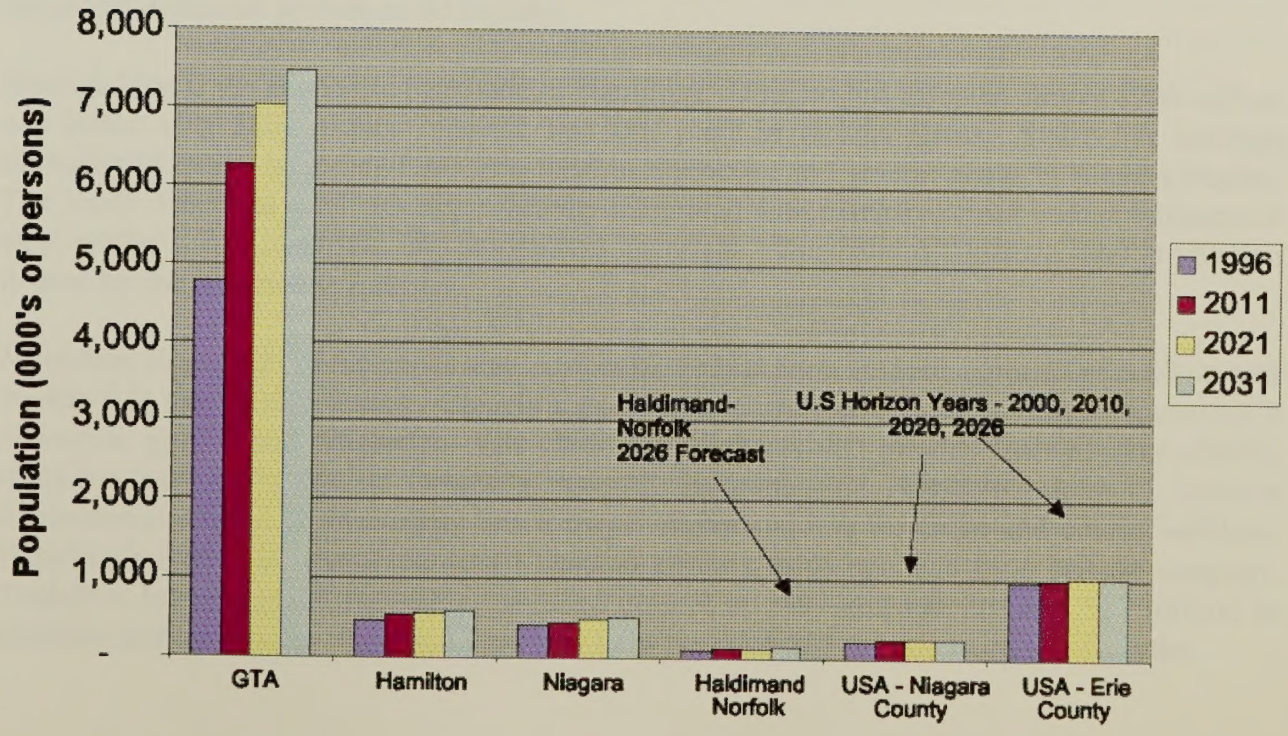
Historical Population Growth by Area

	1980	2000	Growth (%)	Annual (%)
Niagara	368,000	426,000	16%	0.7%
Hamilton	410,000	499,000	22%	1.0%
Haldimand-Norfolk	88,000	110,000	25%	1.1%
Kitchener-Waterloo	307,000	450,000	47%	1.9%
Greater Toronto Area	3,371,000	5,175,000	54%	2.2%
Niagara & Erie Counties	1,243,000	1,170,000	(6%)	--

Employment by Region (1996 - 2031



Population by Region (1996 - 2031



4.2 Outlooks

Over the next 30 years, population and employment growth in the GTA and Kitchener-Waterloo far outpaces the growth in the Niagara Peninsula area and upstate New York.

	2000	2031	Growth (%)	Annual (%)
Niagara	426,000	487,000	14%	0.4%
Hamilton	499,000	592,000	19%	0.6%
Haldimand-Norfolk	110,000	132,000	20%	0.6%
Kitchener-Waterloo	450,000	625,000	39%	1.1%
Greater Toronto Area	5,175,000	7,449,000	44%	1.2%
Niagara & Erie Counties	1,170,000	1,296,000	11%	0.3%

It should be noted, however, that Regional Official Plans currently in place do not provide population and employment estimates beyond 2021. In view of the long term planning process for transportation system development, the permanence and cost of transportation infrastructure and the long-term effect of transportation on land use development, transportation planners must look ahead to 2031 and beyond.

While the above population and employment estimates reflect a continuation of current trends, there are factors to be considered in visioning beyond 2021. Both Niagara and Hamilton are relatively mature urban areas with older populations and have a manufacturing industry reliance that makes them sensitive to economic cycles. Increasing diversification will be the basis for sustained economic growth in the regions.

Steel making is the economic backbone of Hamilton. Dofasco has invested almost $700 million and Stelco over $800 million over the last four years in various plants. Stelco has holdings throughout Ontario including Lake Erie Steel in Nanticoke and several plants in Niagara Region. The North American steel industry is heavily integrated with extensive cross-border shipment of steel products, raw materials, and automotive materials. One-third of Dofasco steel production is used by the automotive industry.

More than 50 per cent of the goods and services of the Hamilton area are exported with 80 percent destined to the United States. Clearly a good transportation system is vital to Hamilton's economic growth and prosperity. The QEW and Highway 403 provide freeway accessibility, Hamilton harbour is one of Ontario's major cargo ports, and Hamilton's John C. Munroe International Airport is developing into a major intermodal hub for cargo and courier services. Hamilton's airport is one of the first Canadian airports to be operated by a private company. TradePort International Corporation assumed control in 1997 and has invested $17 million in facilities and operations. UPS and Purolator have invested $23 million in on-site facilities.

Niagara Region has a more diversified economy with an extensive tourism industry, broad manufacturing base and significant agricultural activity in fruit and wine production. Niagara manufacturing is also integral to Ontario's automotive industry. General Motors of Canada has invested $865 million in its St. Catharines operations since 1998. GenCorp based in Welland is a major North American supplier of vehicle sealing materials. Magna International and other manufacturing firms are investing in the region.

Tourism-related investment has increased substantially over recent years as has been discussed previously. Agri-tourism and grape and wine production are also emerging economic growth industries in Niagara.

Niagara Region's climate, tender fruit and agricultural lands are unique natural and economic resources in Ontario. Seventy percent of Canadian tender fruit production is concentrated in Ontario with 700 fruit growers in Niagara Region. The Niagara Peninsula accounts for 86% of the cultivated fresh and processed grape acreage in Ontario and three-quarters of the vineyard acreage in Canada. Niagara also possesses a lucrative greenhouse industry which generates $250 million in annual sales and employs 3,000 people.

With continued urban development pressure north of the escarpment, the sustainability of the tender fruit lands and agriculture is an issue. Effective land use planning is required to ensure the long-term preservation of agricultural lands, support agri-business and tourism and promote sustainable development in the Niagara Peninsula.

The strategic role of Niagara Region as an international trade and tourism "gateway" and Hamilton as a strategic "doorway" with its freeway, port and airport facilities have been noted as key to the economic growth of the regions and central Ontario. An improved transportation system can make the most of these locational advantages and could accelerate economic development and growth, but is not sufficient alone to achieve regional economic and development goals.

A review of the factors underlying business location decisions indicates that transportation / infrastructure is but one factor in attracting new business and industry to a region. There is no doubt, however, that poor accessibility and limited mobility severely constrains economic development. It should also be noted that industry, carriers and travellers require an efficient and safe transportation system that transcends political boundaries. The need for such a broad transportation and economic strategy has been recognized by the emerging trade corridor coalition of Niagara, Hamilton and Halton, as well as Niagara and Erie Counties in New York.

Factors important in selecting cities:

FACTOR	Percentage
Workfoce Availability	72
Market Access	65
Cost Structure	59
Hospitable Business Climate	56
Quality of Life	52
Transportation / Infrastructure	23
Telecommunications	9

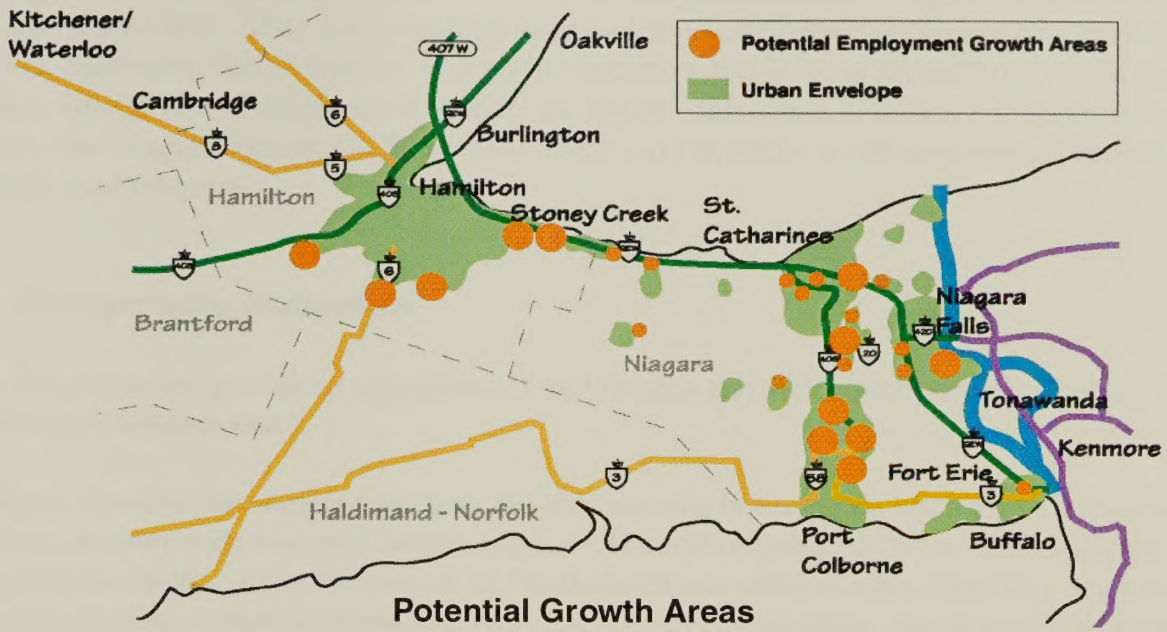
The Niagara Peninsula area has not experienced significant population and employment growth in the past decade. However, the City of Hamilton, the Region of Niagara and to lesser degree, Haldimand County are well positioned on the fringe of the Greater Toronto Area (GTA) to benefit from population and employment "spillover" from the GTA. With increasing traffic congestion, rising housing prices and other concerns in the GTA, these "hinterland" areas and others like Kitchener-Waterloo, Guelph, Barrie and Peterborough will become increasing attractive to household and industry.

While the GTA will continue to be Ontario's primary economic base and attract the bulk of future population and employment, increasing traffic congestion and the resulting increase in travel times and costs may be expected to have more severe and lasting effects on economic growth and opportunity in the GTA. A decentralization of population and employment to hinterland centres is considered to be a natural progression and need not be a negative trend provided that enhanced transportation infrastructure and effective land use planning supports and shapes future urban structure.

In view of the potential for added population and employment growth in the Region of Niagara and City of Hamilton, an alternative long term (2031) growth scenario was tested in this needs assessment study to address the possible transportation implications.

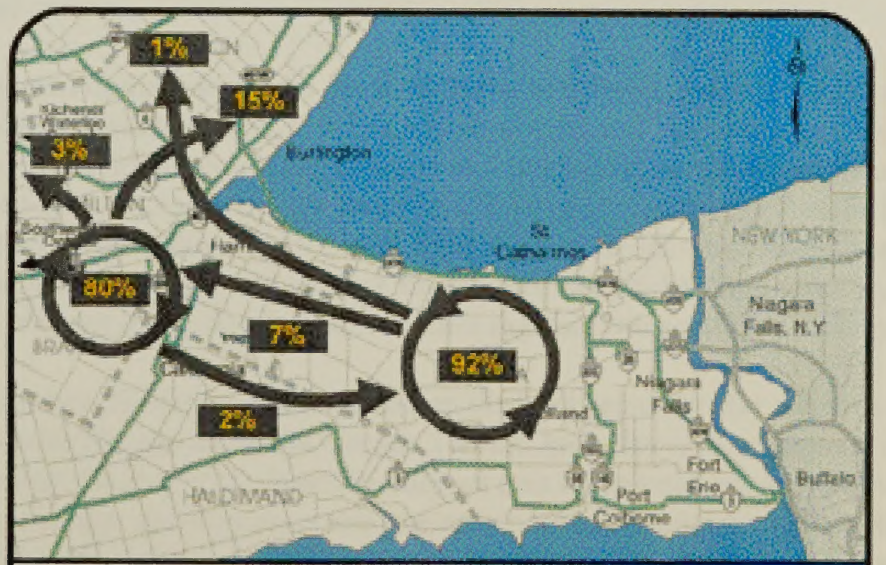
		Base 2031	**Possible Additional**	**2031 High Growth Scenario**
Niagara	Population	487,000	54,200	541,200
	Employment	202,000	30,000	232,000
Hamilton	Population	592,000	101,700	693,700
	Employment	261,000	55,000	316,000

There are sufficient designated residential and industrial lands in both Hamilton and Niagara to accommodate the additional 2031 population and employment growth. It is, of course, important to locate, service and phase this development in a way that best meets regional economic and planning goals. Further, the characteristics (e.g., age profile, labour force composition, etc.) of the population, and the nature of the employment must be considered. However, these aspects go well beyond the mandate and capability of this transportation needs assessment study and must be examined by the regional planning agencies.

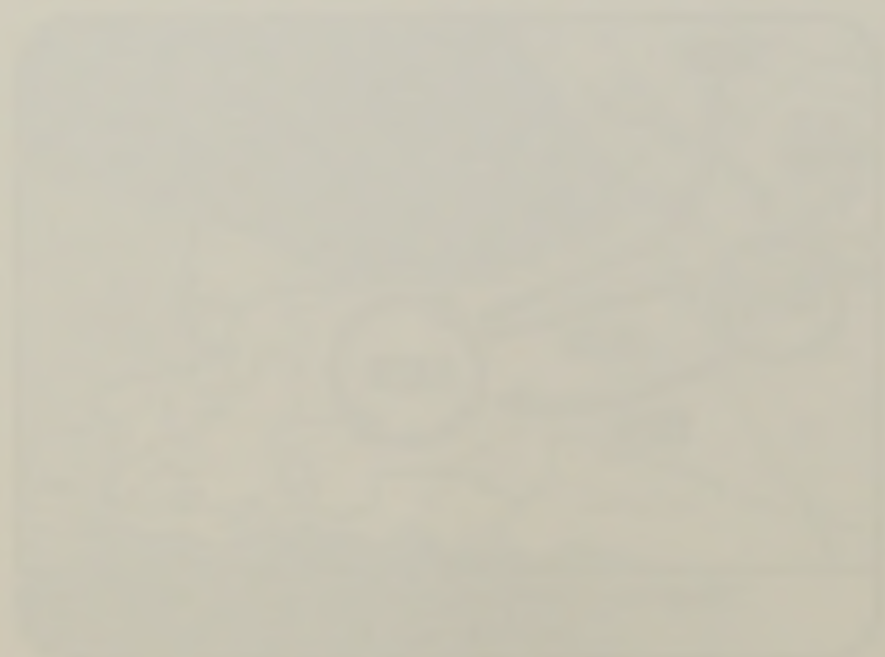


Potential Growth Areas

Higher population and employment growth will invariably result in greater commuting and other trips largely by automobile in the region. Currently, in Niagara Region, about 92% of all trips are internal to region, 1% travel to the GTA and 7% travel to points west towards Hamilton. While this high degree of trip-containment limits long distance trips from Niagara Region to the outside points, much of the local travel is focused on a limited number of constrained provincial and municipal roadway corridors.



Niagara / Hamilton Home Based Trips
Trip Distribution



For trips generated in Hamilton, about 80% are internal with 2% destined to Niagara and 15% destined to the rest of the GTA. This is a fairly high degree of trip-containment relative to regions within the GTA. However, the 15 percent of travel to and from the GTA is focused on two freeway corridors: the QEW and Highway 403 which are highly constrained. Further, within the City of Hamilton, the Niagara escarpment forces auto, truck and bus traffic to utilize a limited number of municipal road crossings.

4.3 Transportation Implications

Given the projected growth in population, employment and subsequent travel, what are the transportation implications?

The City of Hamilton has regular commuter rail and inter-city bus services, limited VIA rail service, as well as a major public transport system in place. The role of public transit is emphasized in the region's Vision 2020. As in the case of all North American urban centres, Hamilton has seen a substantial decline in public transit use over the last several decades. In view of the serious constraints crossing the escarpment within the city, public transit will have to play a greater role in the future in order to support future population growth goals.

While passenger rail service should be considered to alleviate weekend congestion and promote tourism, there would appear to be less potential for regular weekday commuter rail. This is fundamentally due to the fact the Niagara Region has successfully achieved a high degree of commuter trip containment than GTA regions. Secondly, the region has developed around a number of major urban nodes – St. Catharines, Niagara Falls and Welland, Fort Erie, Port Colborne and smaller communities connected by major travel corridors that are not well served by expensive rail options.

While commuter rail options might be pursued in the long term, there is a need in the short to mid-term to address regional corridor needs with conventional bus services. Express services running from the major urban centres to Hamilton and Burlington could also address inter-regional commuter transit needs. A commuter bus service would provide the flexibility to pick-up passengers at dispersed locations with varied timetables at far less cost than fixed rail systems. The potential for commuter rail and express bus service should be considered by the Regional Municipality of Niagara in the development of their regional transportation strategy.

As noted in the tourism discussion, marine transport does not presently play a role in the movement of passengers from the Niagara area to the Greater Toronto Area. Previous attempts at running largely high-speed passenger ferry services from the Niagara area to Toronto proved not to be financially viable. As commuter trips are obligatory and generally occur at fixed time periods, there must be a high degree of reliability in the service to capture and maintain a regular user base that will generate sustained revenues. Thus, service schedules, the need for good access by road, unpredictable weather and seasonal conditions will always be challenges for commuter based ferry operations. Due to issues related to infrastructure costs (e.g., docking), parking, bus connectivity etc., the Regional Municipality of Niagara must play a key role in any private sector proposal for ferry operation.

The Niagara and Hamilton areas are currently well served by small airports that could conceivably serve local commuter and business needs in the future. As John C. Munro Hamilton International Airport operates during the night and handles jet aircraft, it could play this role in the future. At this point in time, however, there is not a sufficient client base.

Over the long term, with development adjacent to the airport or the attraction of high technology and other industry and business to the broader region, there may be sufficient demand for business and commuter air services. Increased traffic congestion around Toronto can be expected to make it more difficult in the future for travellers from southwestern Ontario and Niagara to access Pearson Airport. With a catchment population of 3.5 million within a 60 minute drive to Hamilton International Airport, increased GTA road and air congestion could therefore make the Hamilton a major secondary hub in the Ontario airport system. The addition of a new east-west freeway connection would enhance this potential.

The higher growth population and employment scenario will put more pressure on the provincial and municipal roadway systems, particularly during peak weekday ravel periods. The ensuing municipal road congestion could in fact spillover on to the provincial highway system serving longer distance truck and tourist traffic. This is already an issue on the QEW through St. Catharines.

A Highway 420 extension from the QEW at Niagara Falls to the Thorold Tunnel connecting to Highway 406 would provide an alternate high-capacity route to alleviate QEW congestion between Niagara Falls and St. Catharines. In addition, advanced technology, freeway traffic management systems, and other measures could optimize provincial and municipal roadway usage.

While a mid-peninsula corridor option would be well located to serve planned development areas in both Niagara and Hamilton, it would not significantly reduce commuter travel between Niagara Region and Hamilton, due to the high level of regional trip containment. Further, most of the interregional trips are from the Town of Lincoln and Grimsby to Hamilton.

In the case of Hamilton, the QEW and Highway 403 corridors through the city are presently heavily used. Even with higher use of transit, the anticipated growth in truck, tourism and commuter travel will require additional highway capacity. While some further expansion of the QEW and Highway 403 is possible, major improvements are not feasible without significant environmental impacts.

A new freeway route around the City of Hamilton would provide a high capacity alternative to Highway 403 and the QEW. Enhanced transit service within the new corridor could also be considered.

With strong land use planning and economic strategies in place to facilitate urban center development, plus the current urban structure and trip orientation, the existence of a new east-west freeway corridor is not anticipated to result in urban sprawl over the length of the corridor.

Moreover, in the case of a new corridor, there is an opportunity to limit or preclude development in specific areas.

The QEW is anticipated to remain as a major trade and tourism corridor as well as primary commuter artery linking existing communities north of the Niagara escarpment. The resulting development pressures along the QEW corridor may therefore require policy and planning restrictions or other devices to curtail development on the unique agricultural lands.

APPENDIX 1

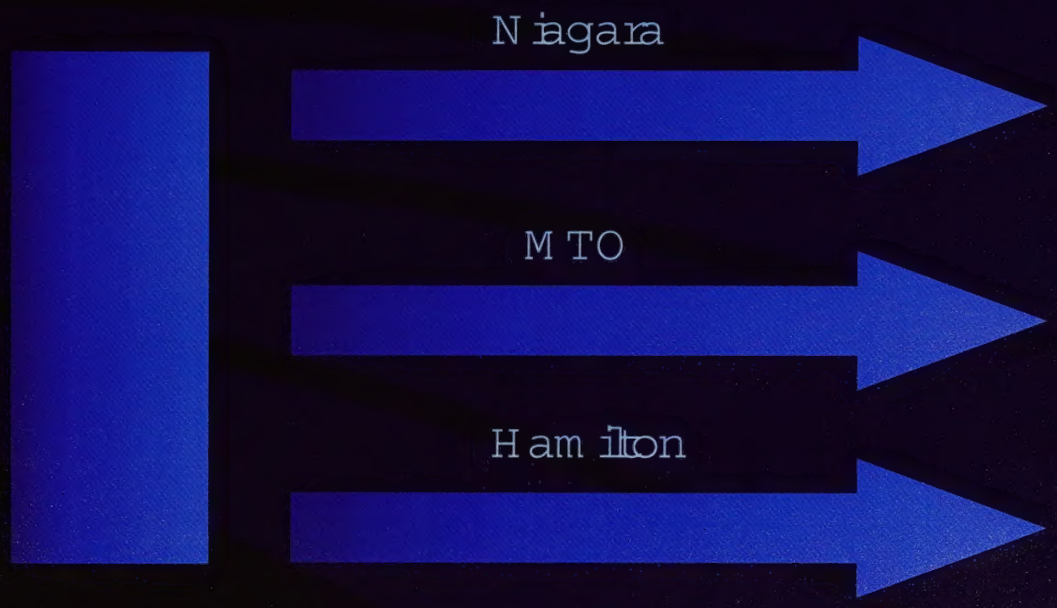
Copies of Slides used at the December 5, 2000 Socio-Economic Workshop

NIAGARA PENINSULA TRANSPORTATION NEEDS ASSESSMENT STUDY

Socio-Economic Workshop

December 5, 2000

Provincial-Municipal Partnership



Background

- Transfocus 2021 Summary Report, 1995.
- Niagara Gateway Study released December, 1998.
- Minister announced Needs Assessment Study, March 2000.
- Minister announced retention of consultant, July 2000.
- Completion in Spring, 2001.

Background

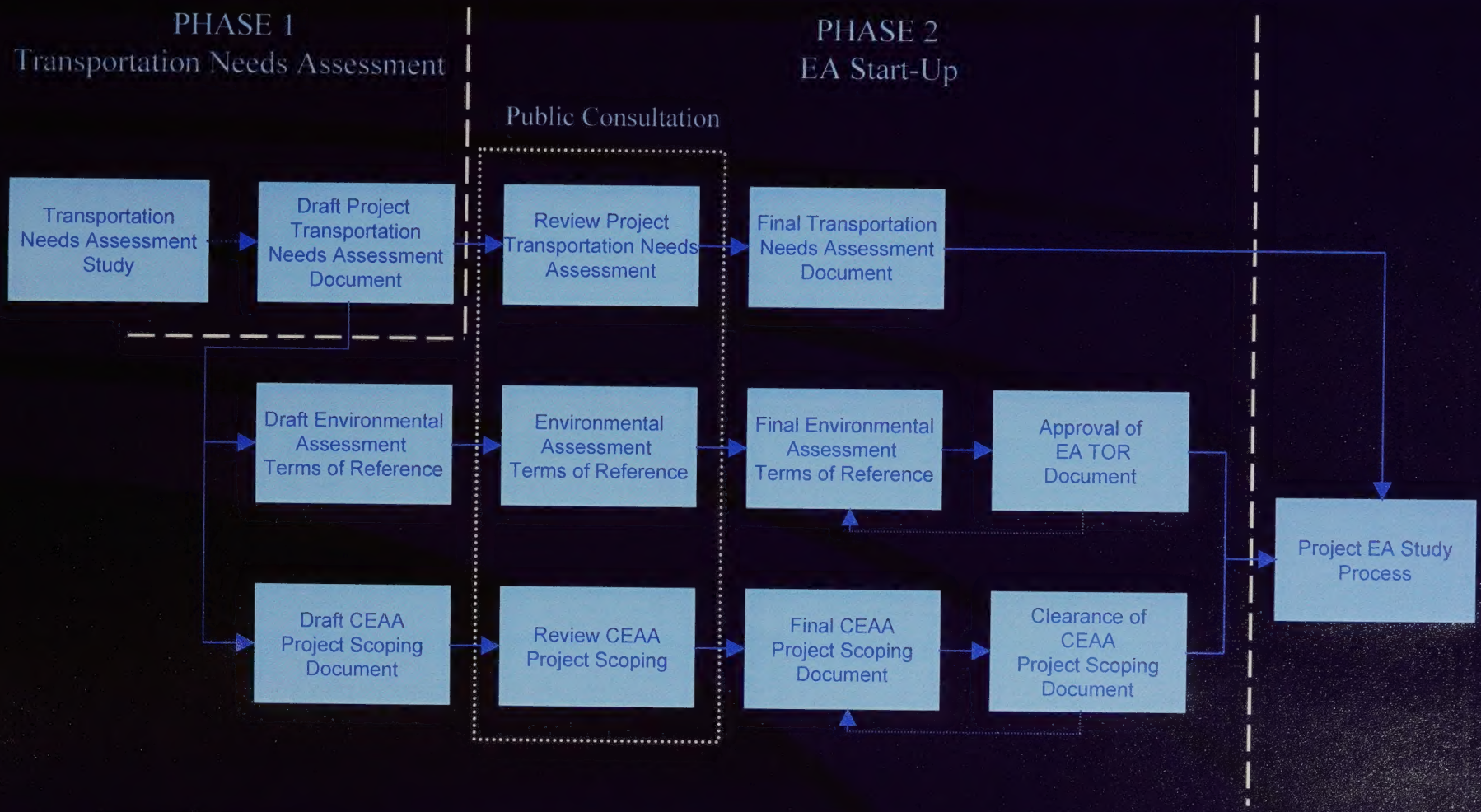
- Needs Assessment Study, July 2000
- Niagara Crossing Bridge Survey, August 2000
- Niagara Regional Plan Review
- Trade Corridor Roundtable Proposal
- Niagara Regional Transportation Strategy

MTO Transportation Planning Objectives

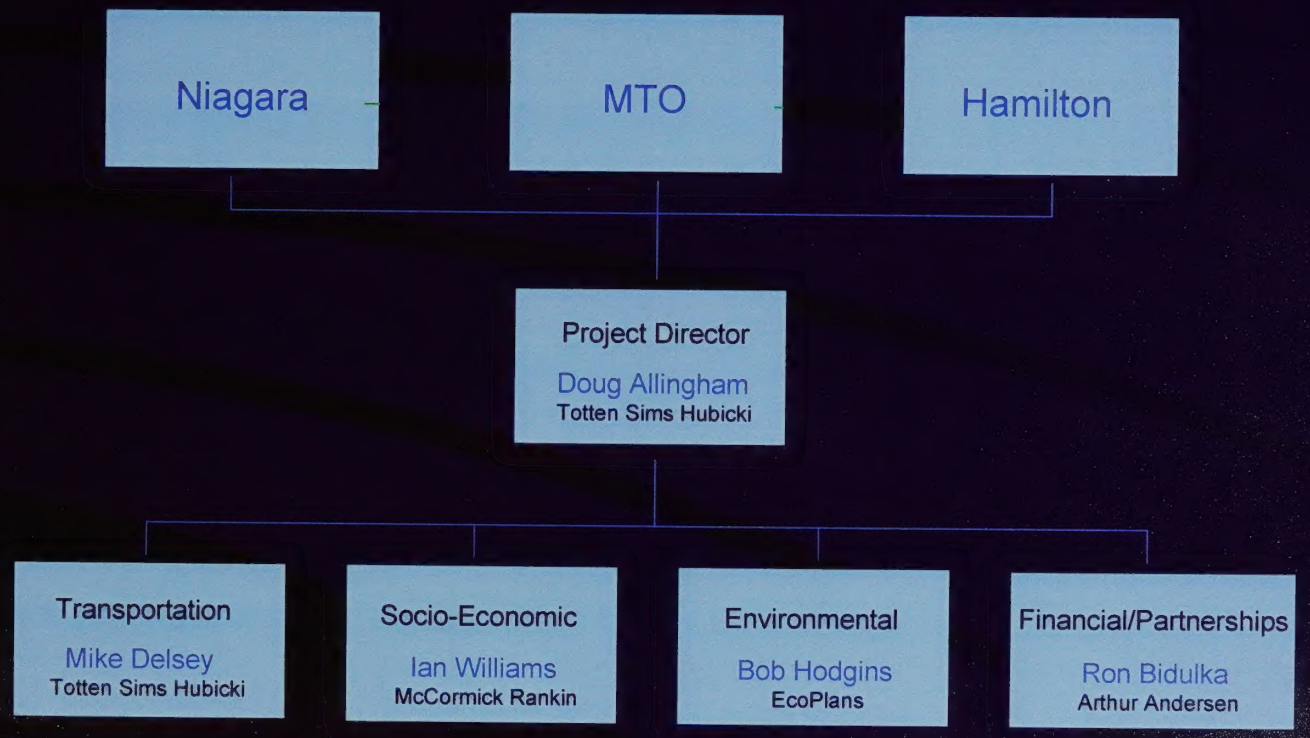
- Long-range planning to facilitate the safe and efficient movement of people and goods over the next 20-30 years.
- Support a positive environment for economic growth and job creation in Ontario.
- Work with partners to plan, finance, develop and manage highways.
- Focus on major highways, trade corridors and gateways
  - 400 series highways, QEW, international crossings.

MTO Transportation Planning Process

Initiation of Environmental Assessment Process for New Freeways



Study Team Organization



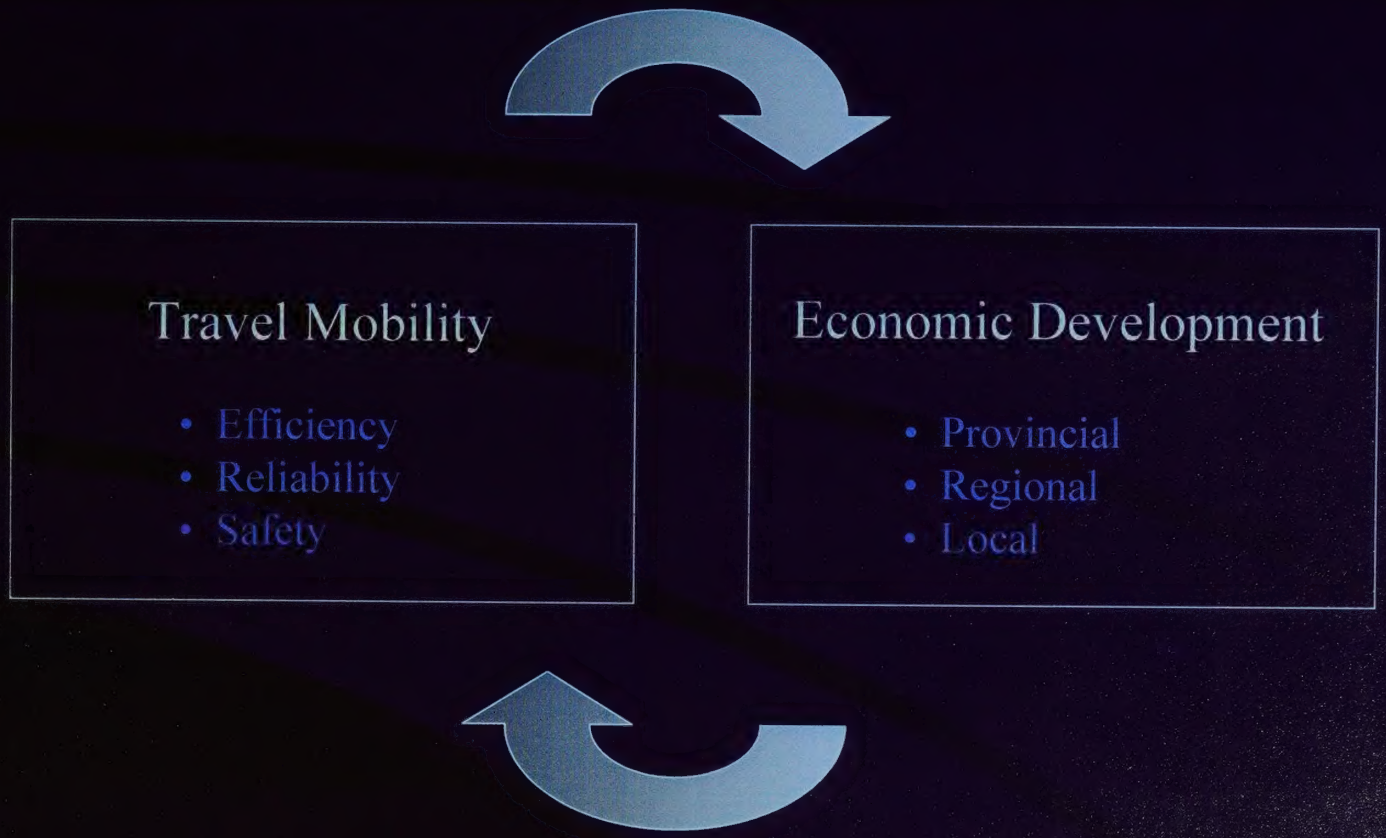
Transportation Needs Assessment

An assessment of the long range transportation problems, opportunities and options in a corridor or broader study area. The purpose is to ….

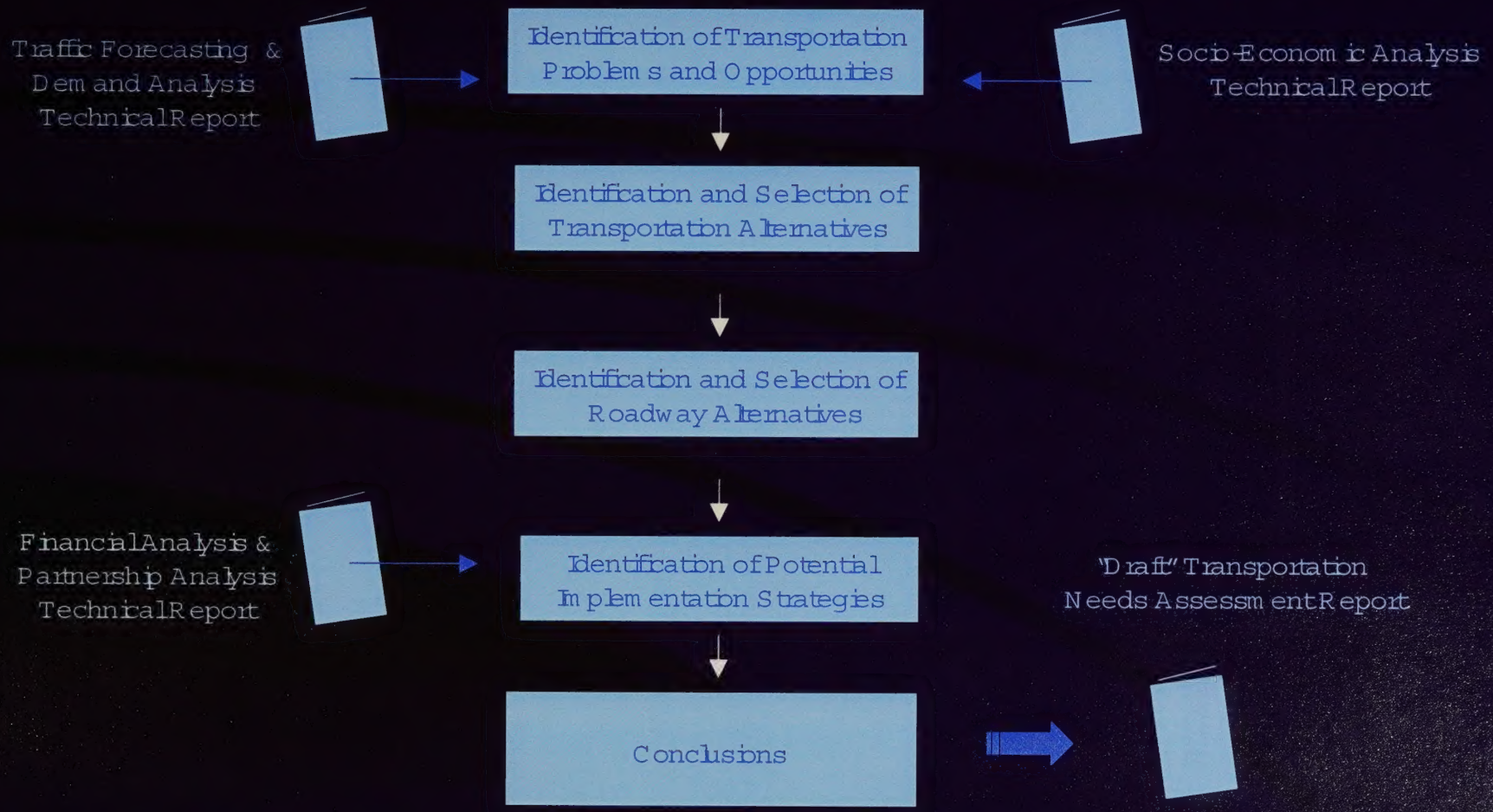
- Create a transportation development strategy for the next thirty 30 years or beyond.
- Determine the technical need, justification, proponency for recommended transportation improvements.
- Provide technical input to "Phase 2" of the E.A. initiation process and, ultimately, the "Planning Component" of E.A. Studies for specific projects.

Doing our "homework" before proceeding with formal E.A. process

Transportation Needs Assessment Goals



Transportation Needs Assessment Study Process and Products



Study Consultation

- Regional Municipalities of Niagara and Hamilton-Wentworth, as well as Haldimand-Norfolk and Halton.
- Ministries of Municipal Affairs and Housing; Tourism; and Economic Development and Trade.
- Limited Stakeholder Consultation:
  - Major Industry
  - Shippers
  - Carriers
- Agency Consultation/Contacts:
  - St. Lawrence Seaway Commission
  - N.F.B.C. and Buffalo-Fort Erie Peace Bridge Authority
  - New York State D.O.T.

Socio-Economic Workshop

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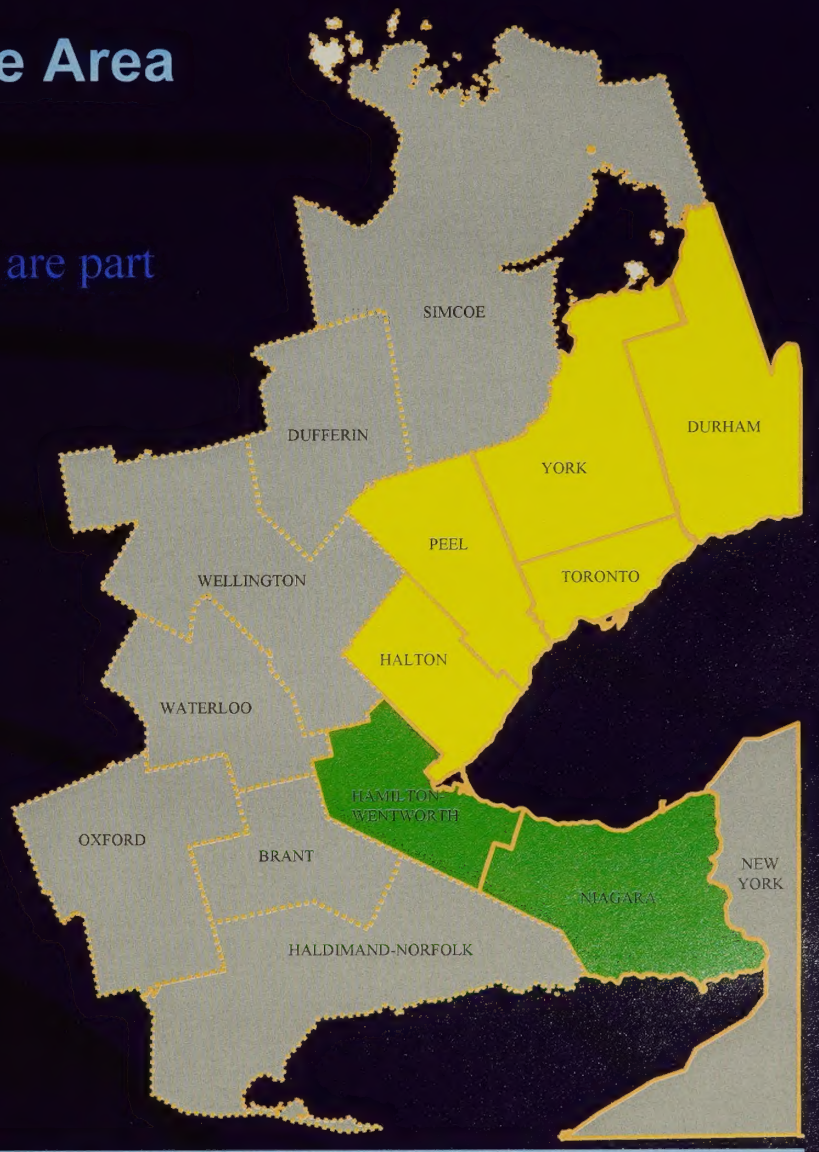
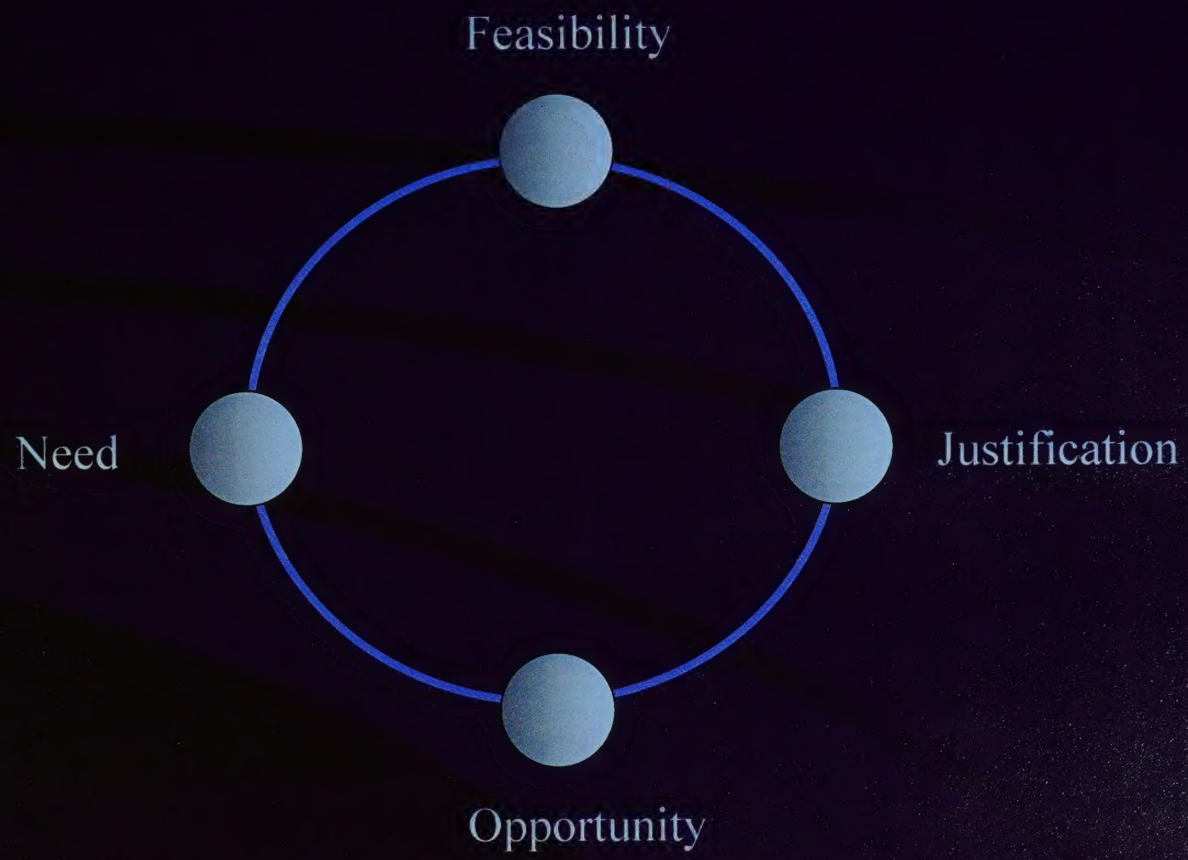
Greater Golden Horseshoe Area

- Niagara and Hamilton-Wentworth are part of the broader GTA hinterland
- Niagara Region is linked to Western New York State
- Niagara Peninsula is the gateway to the GTA and hinterland area.



Transportation Needs Assessment Components



ARTHUR ANDERSEN

Corporate Finance | Real Estate Advisory Services

Goods Movement and International Trade

Ontario

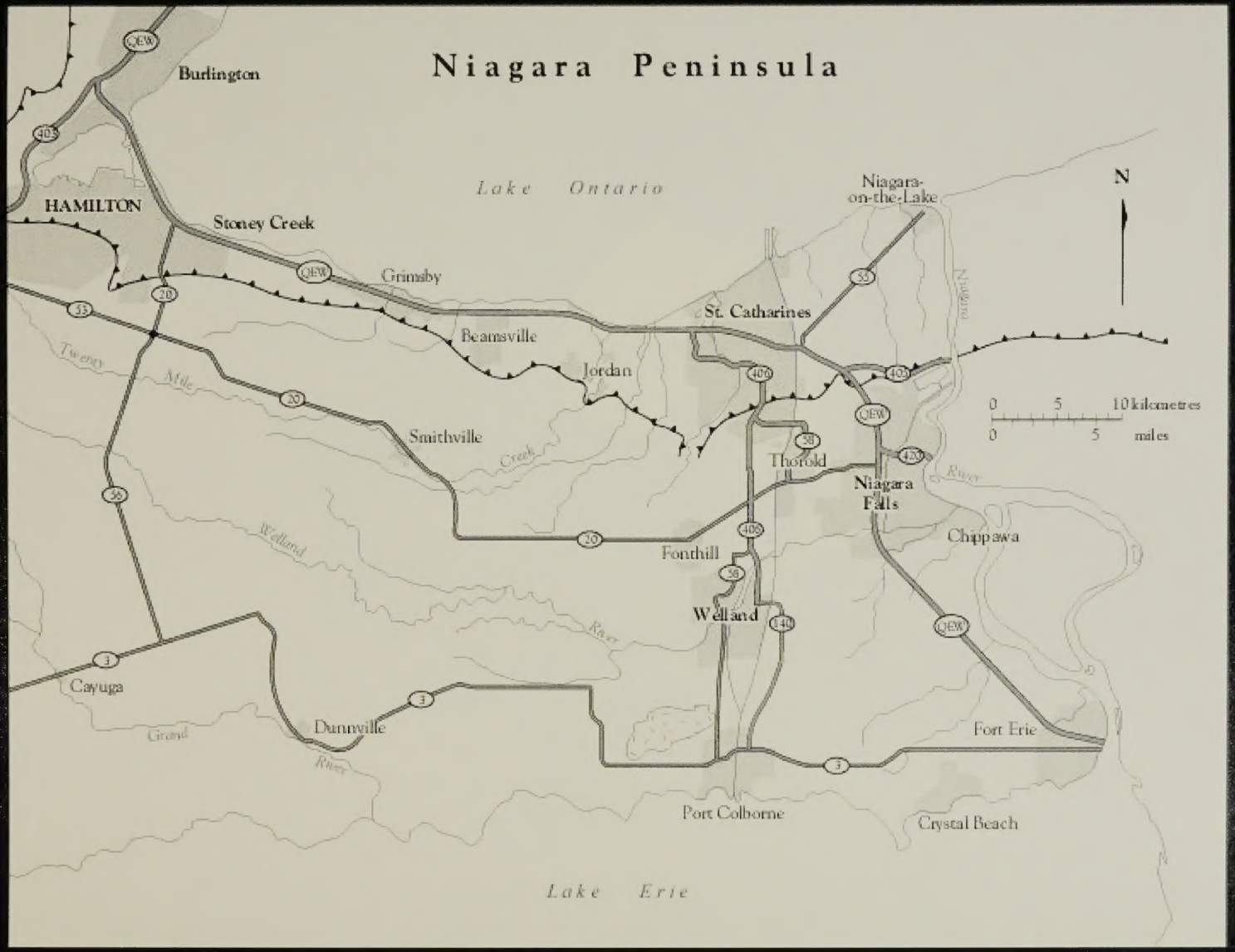
Regional NIAGARA

Regional Context

"From an overall economic / goods movement / international trade perspective, one must look at the Hamilton - Niagara Region as part and parcel of the overall golden horseshoe / provincial perspective"

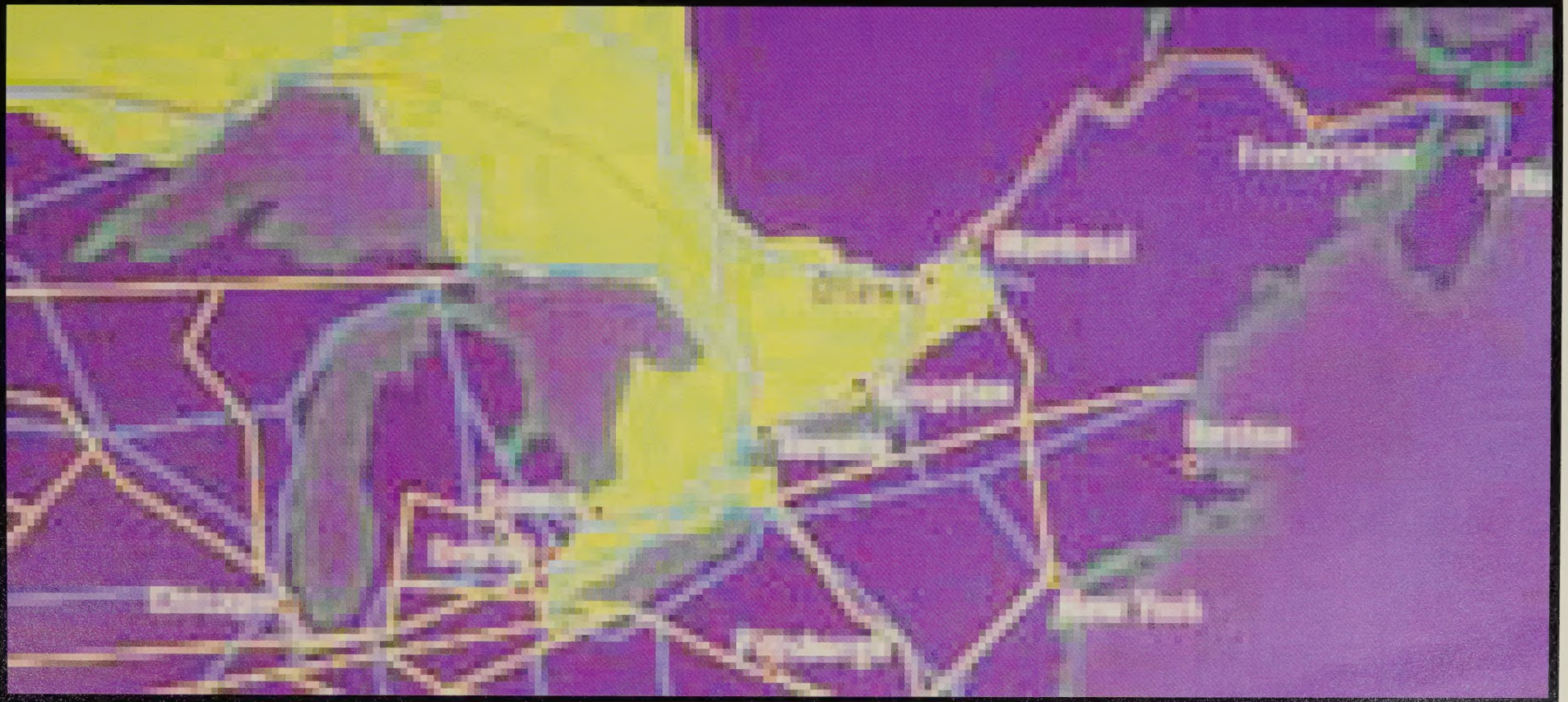
Regional Context (continued)

Regional Context (continued)

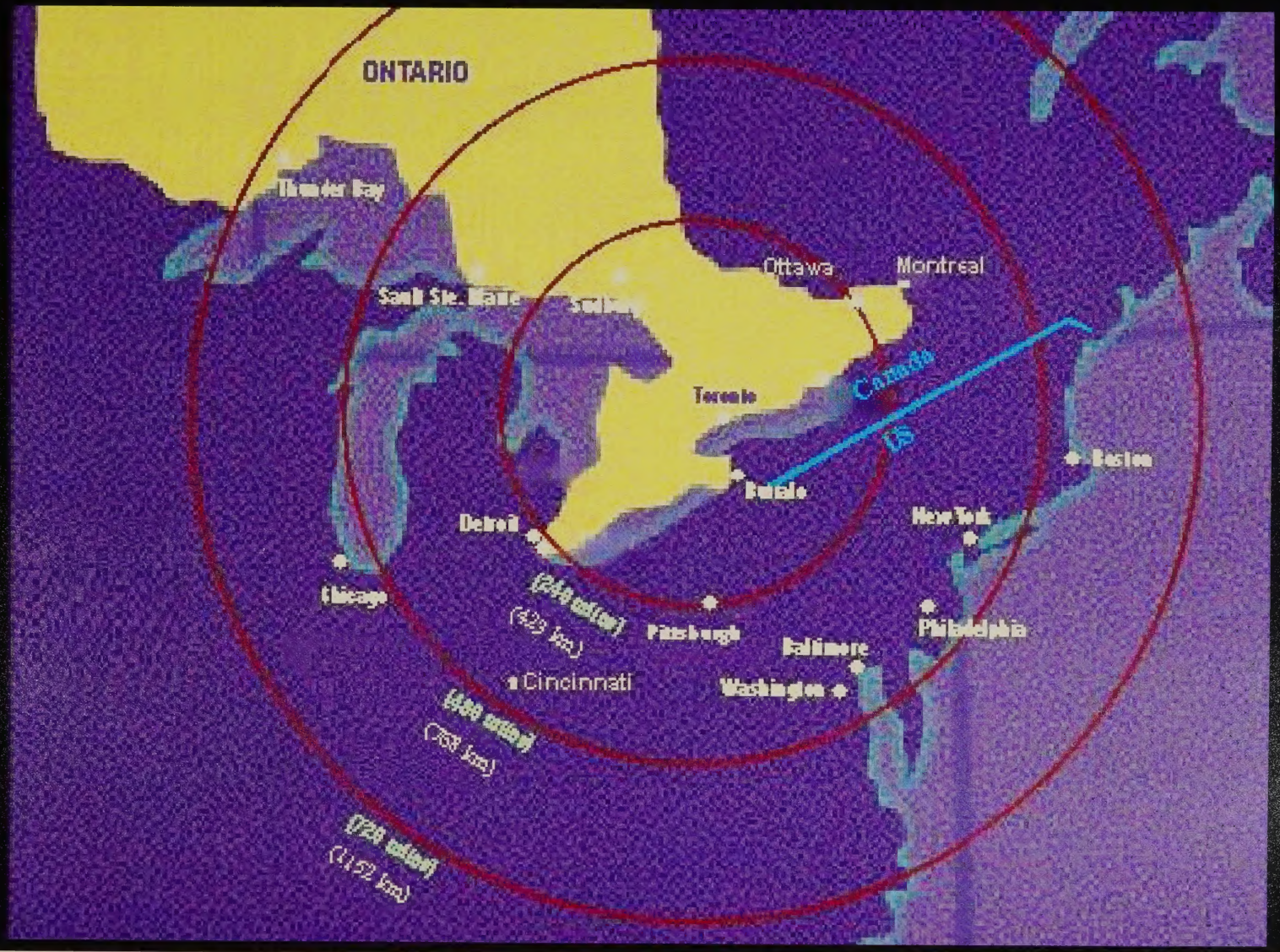


Regional Context (continued)

Regional Context (continued)



Regional Context (continued)

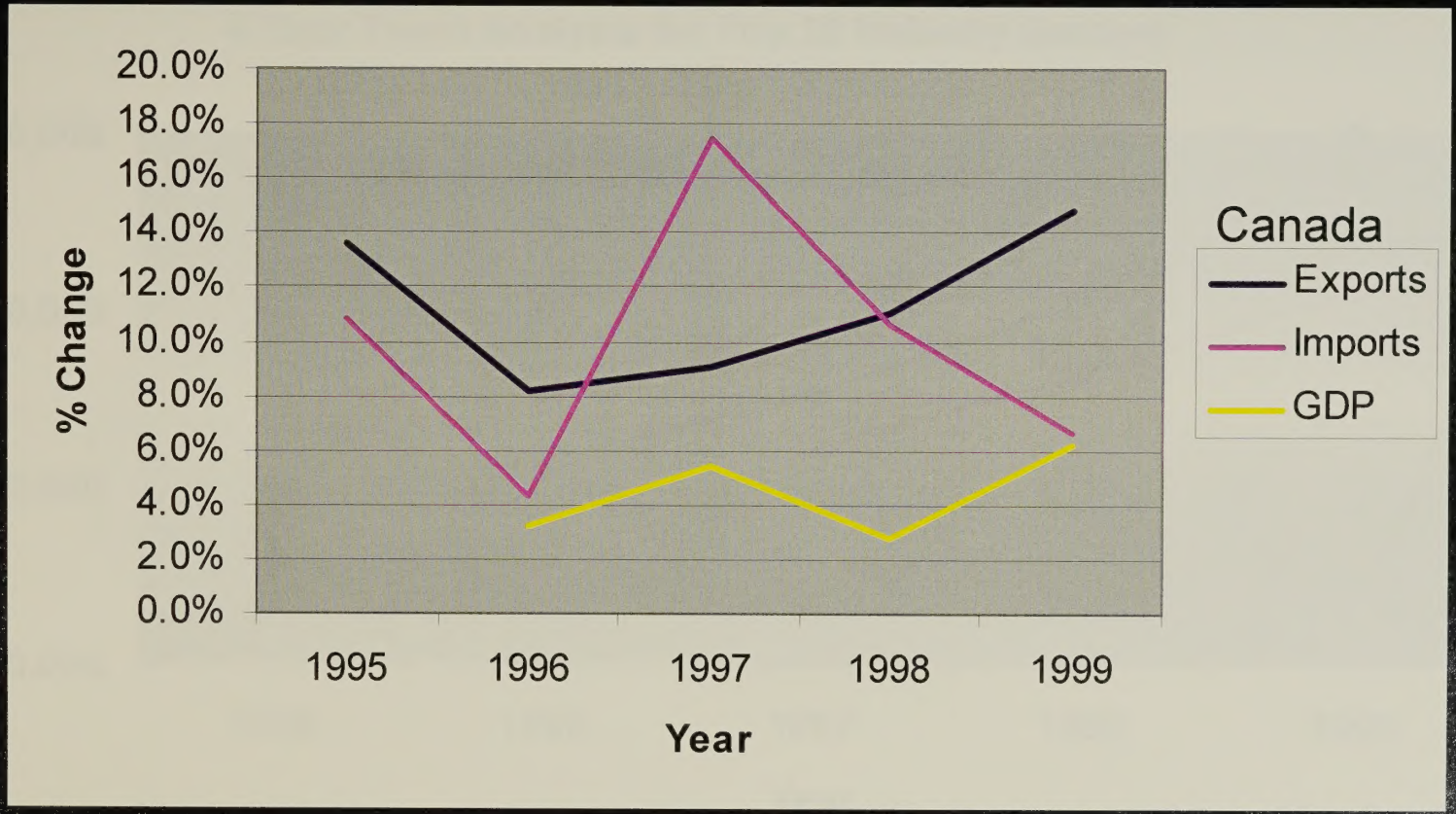


International Trade

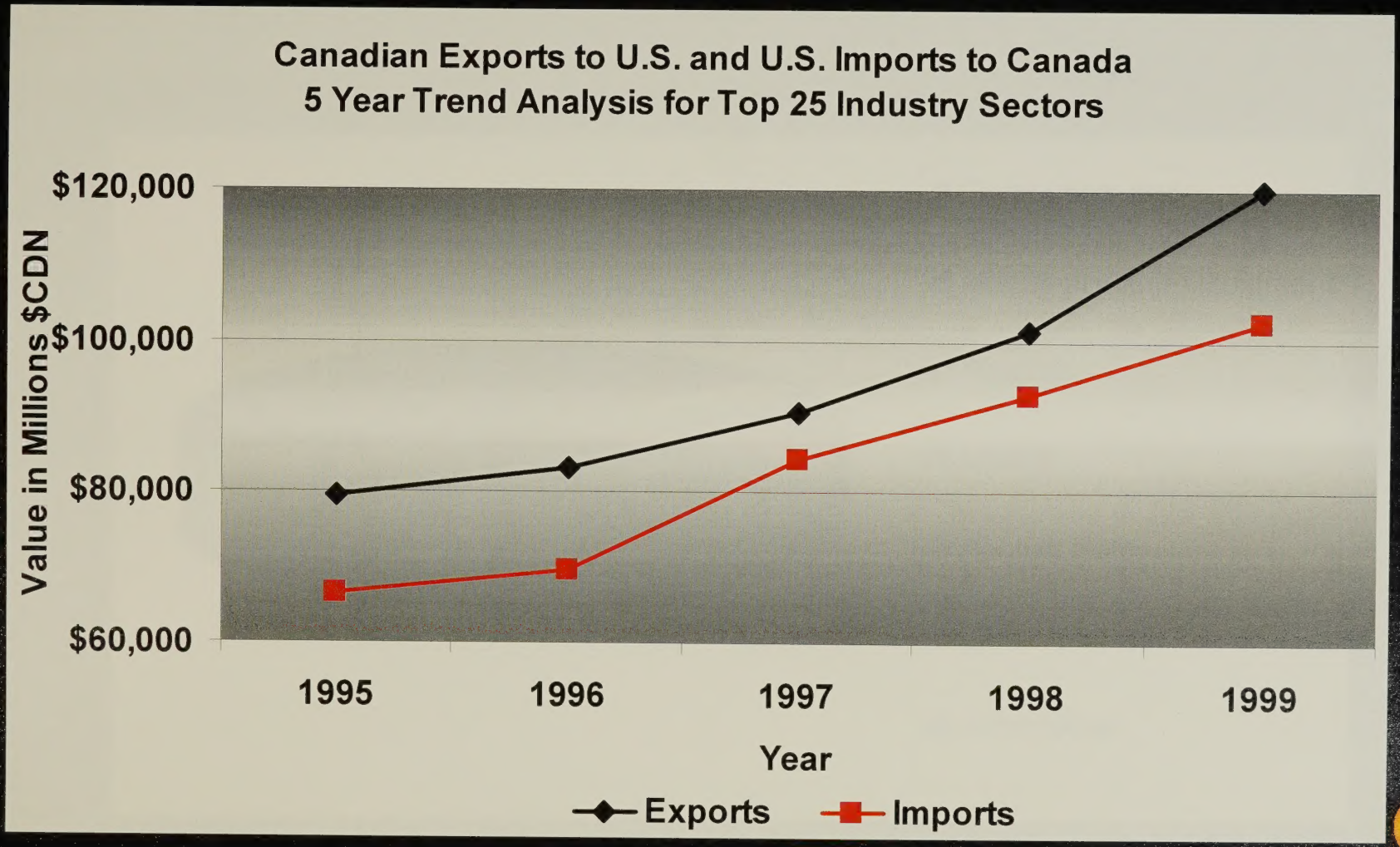
"Niagara - Hamilton the entry point to the #2 border crossing in Ontario in terms of international trade"

International Trade (continued)

- International Trade becoming more important to overall economy

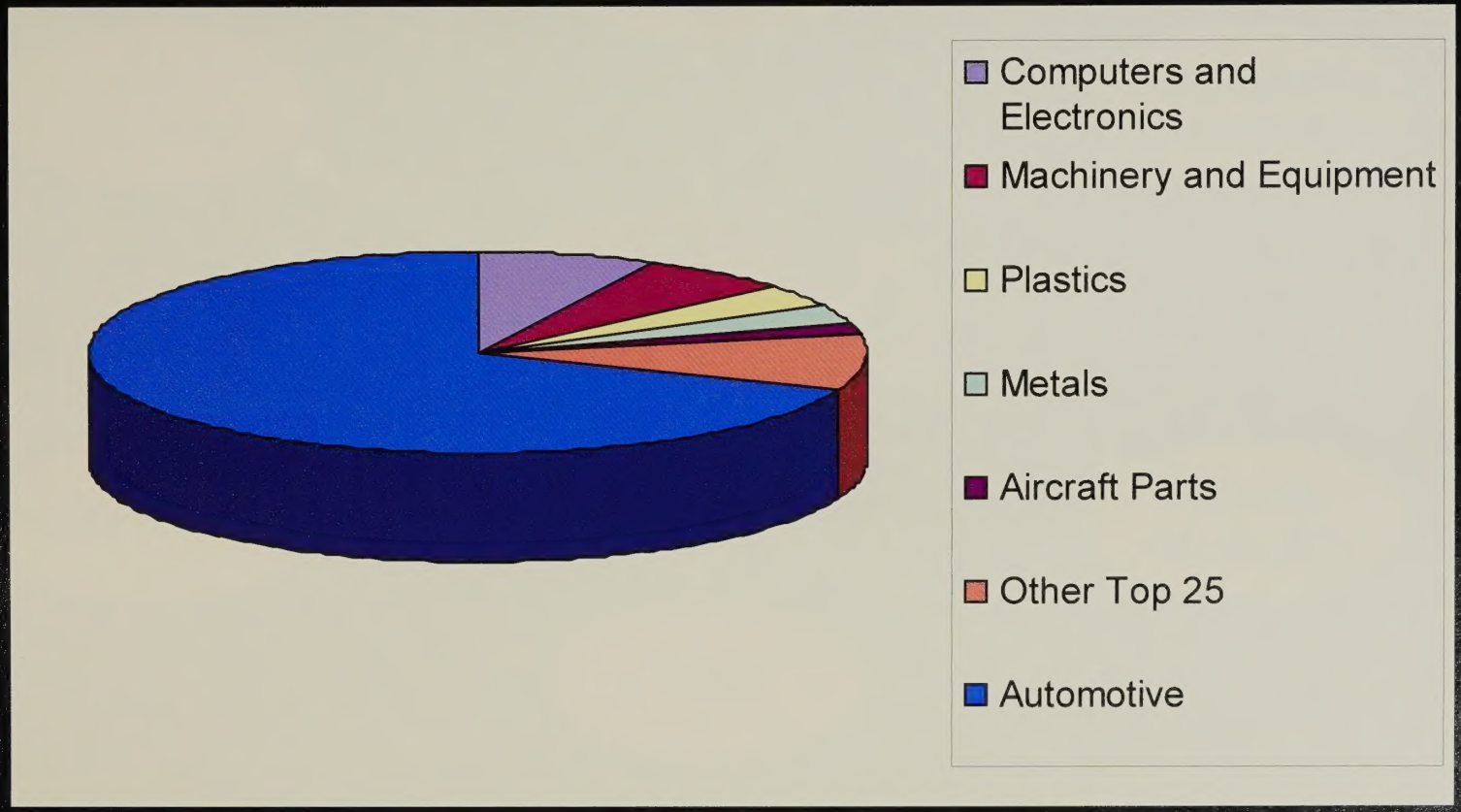


International Trade (continued)



International Trade (continued)

- Automotive and related industries (parts, engines, accessories) dominate Top 25 exports to U.S in value

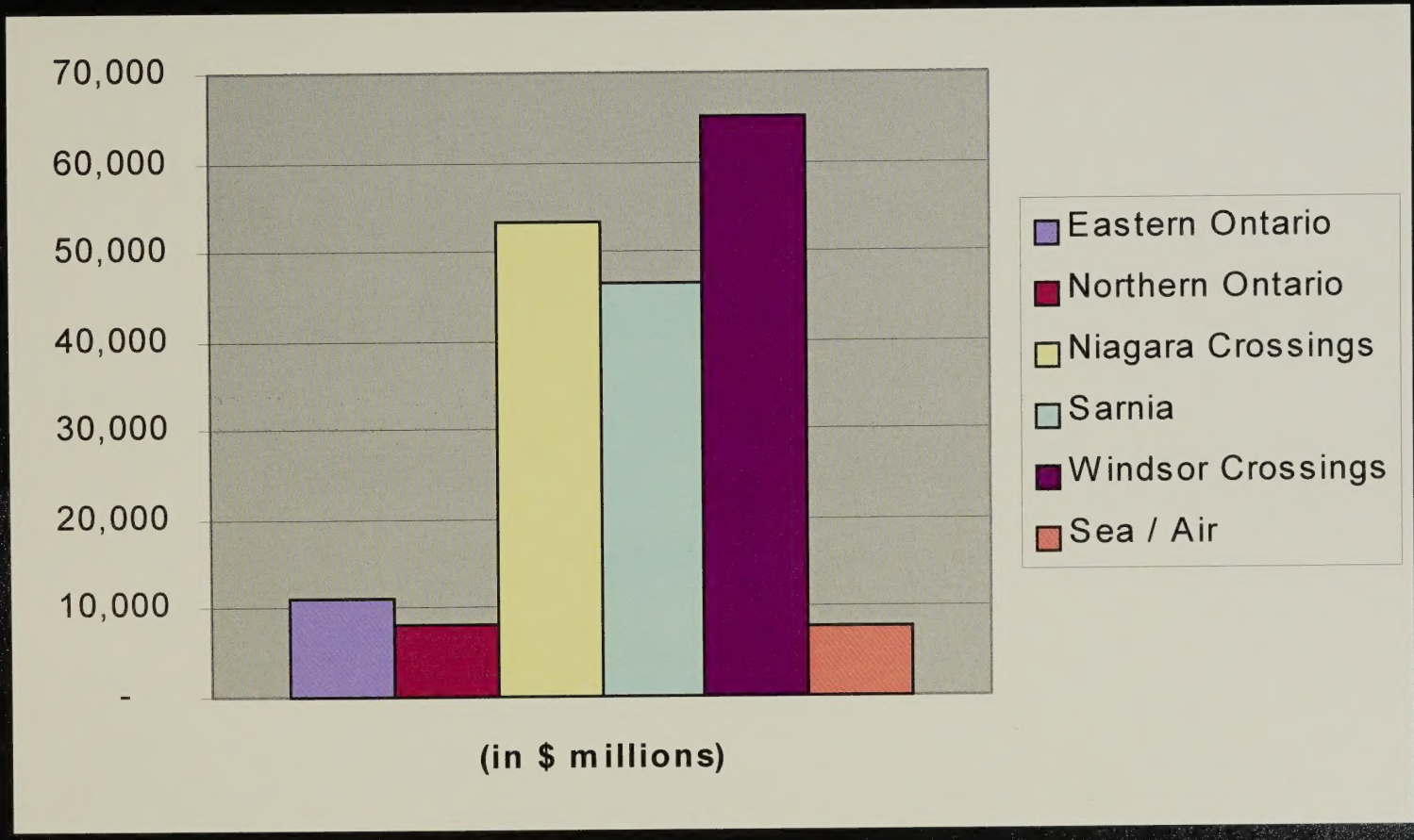


International Trade (continued)

- Factors fuelling trade

International Trade (continued)

- Windsor, Niagara and Sarnia key border crossings in Ontario for trade



International Trade (continued)

- Geographic distribution of trade through Niagara

International Trade (continued)

- Geographic distribution of trade through Niagara (continued)

International Trade (continued)

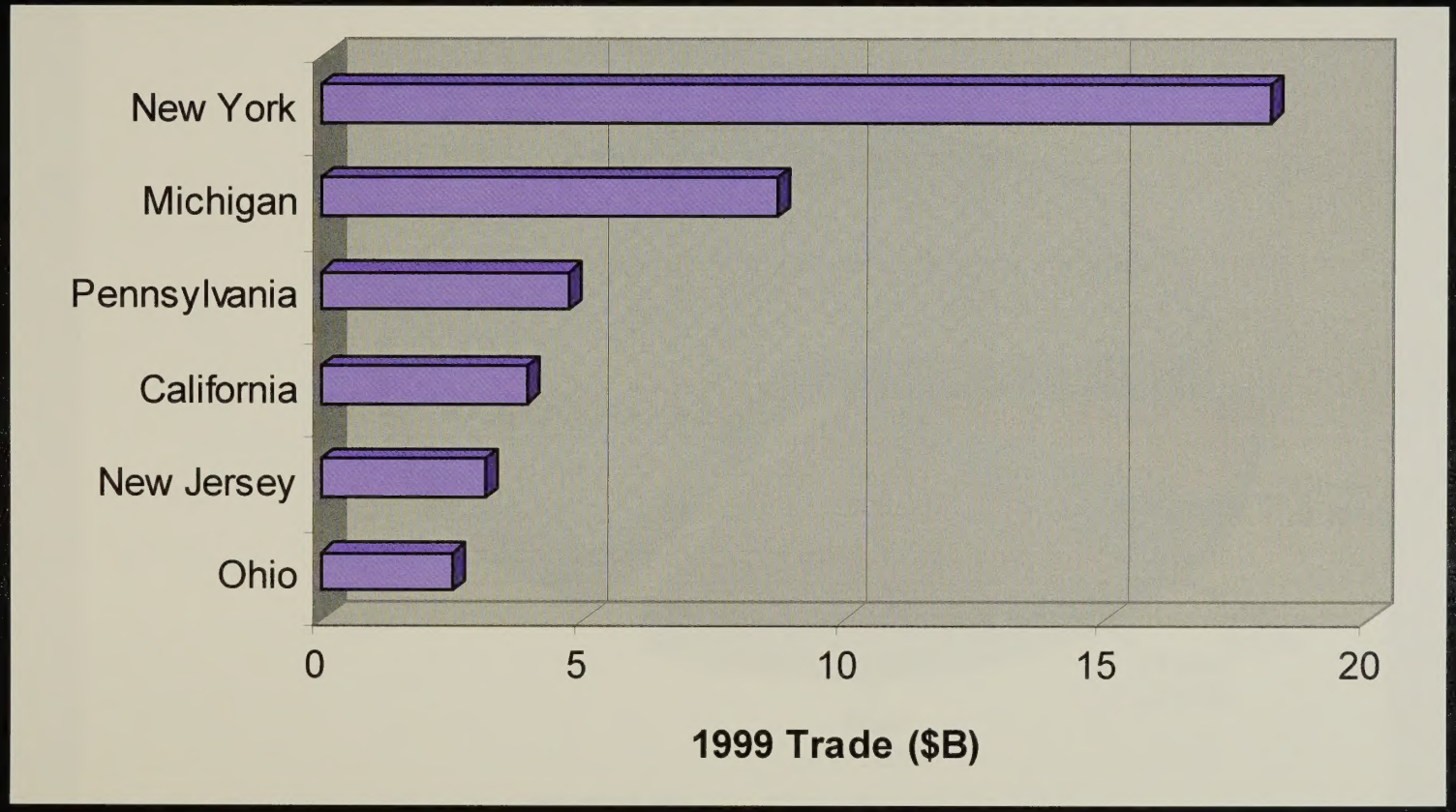
- Geographic distribution of trade through Niagara (continued)

Transportation and Trade

"Truck is and will continue to be the principal mode of transport"

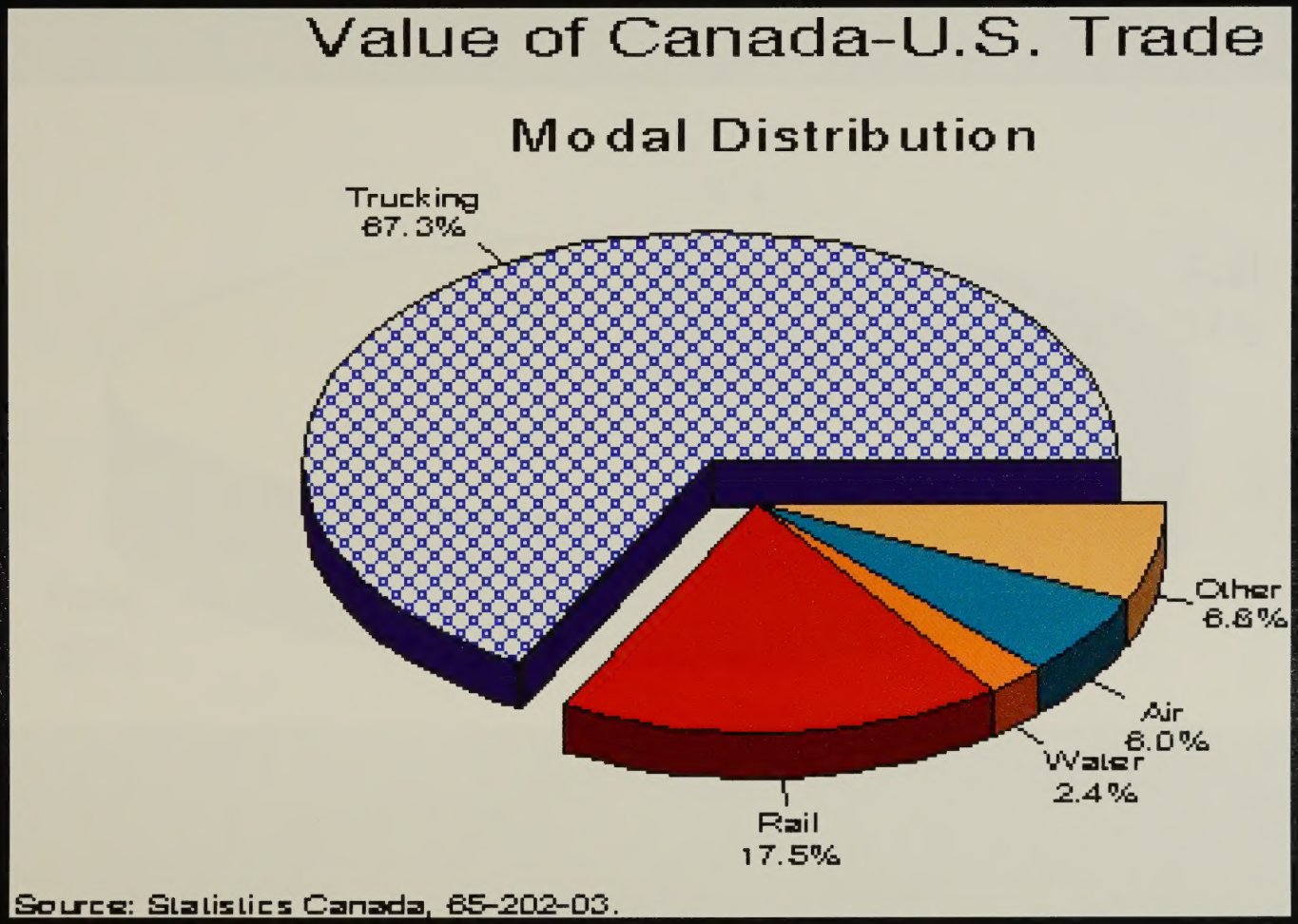
Transportation and Trade (continued)

- Major end-market for goods through Niagara are north-eastern U.S. states



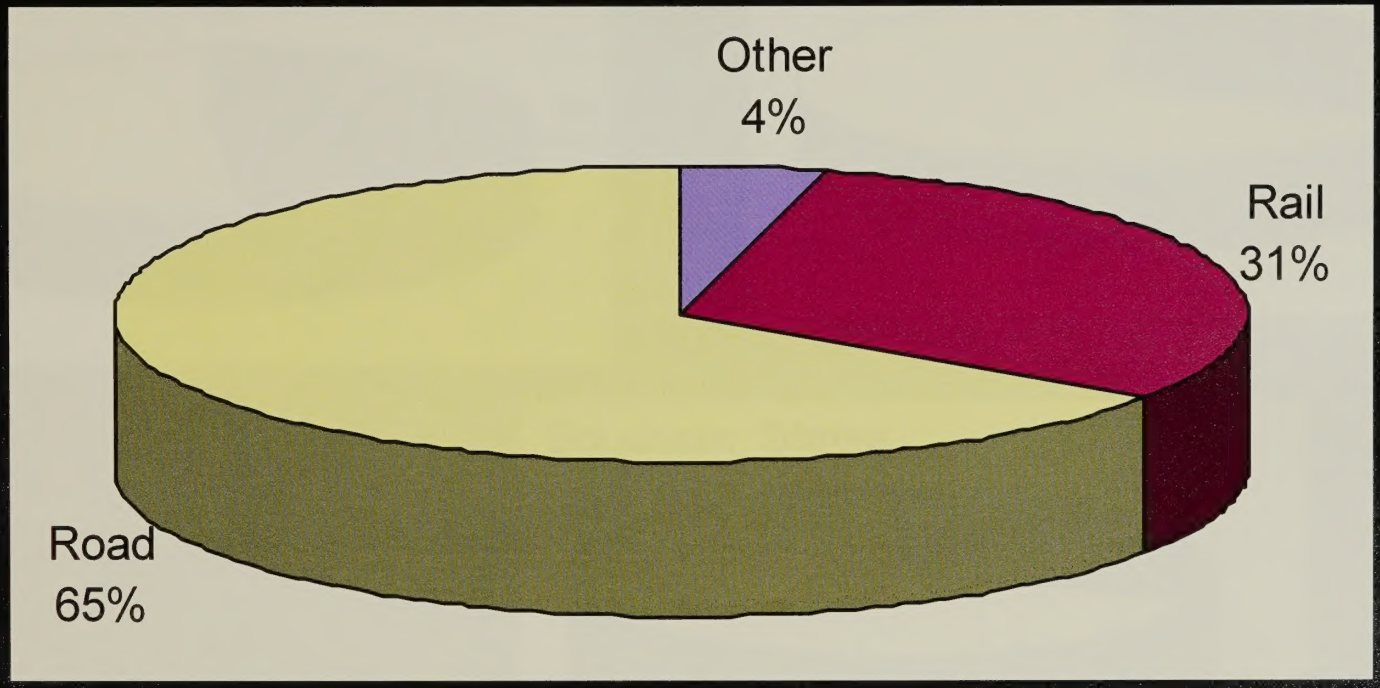
Transportation and Trade (continued)

- Modal distribution of cross-border trade is primarily truck



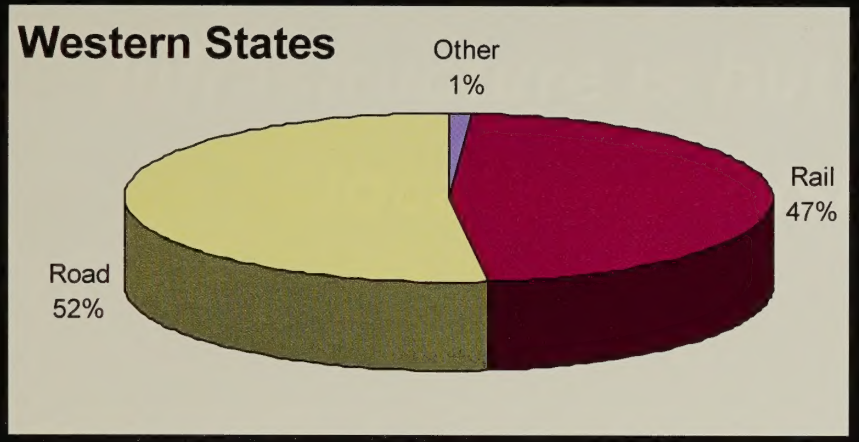
Transportation and Trade (continued)

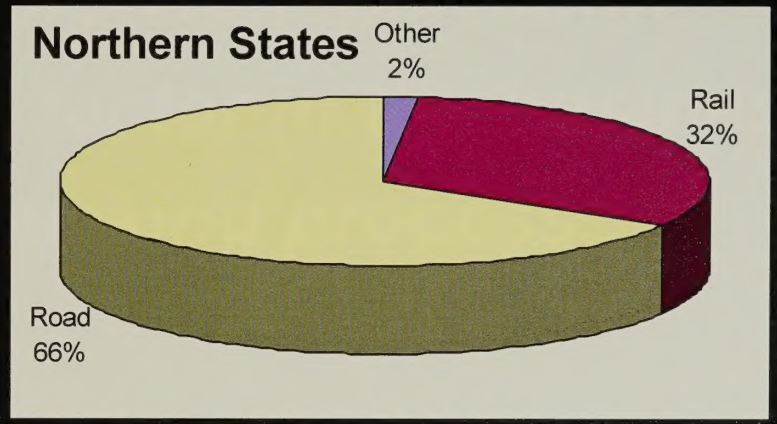
- Hamilton - Niagara modal choice still truck, but rail more significant

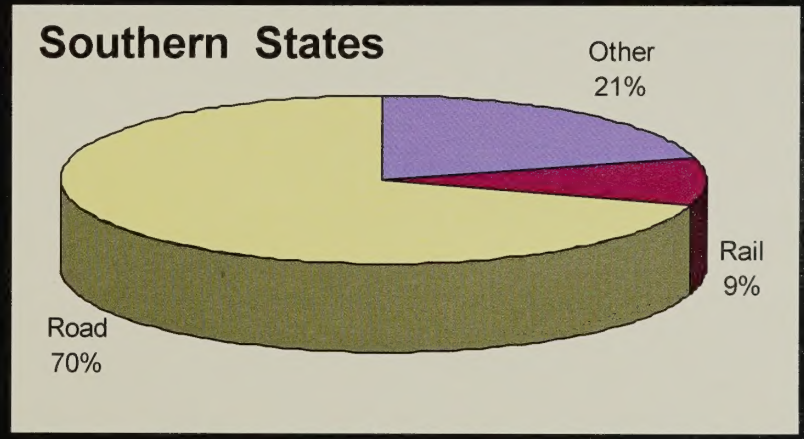


Transportation and Trade (continued)

- Hamilton - Niagara modal choice, by end-destination







Transportation and Business Location

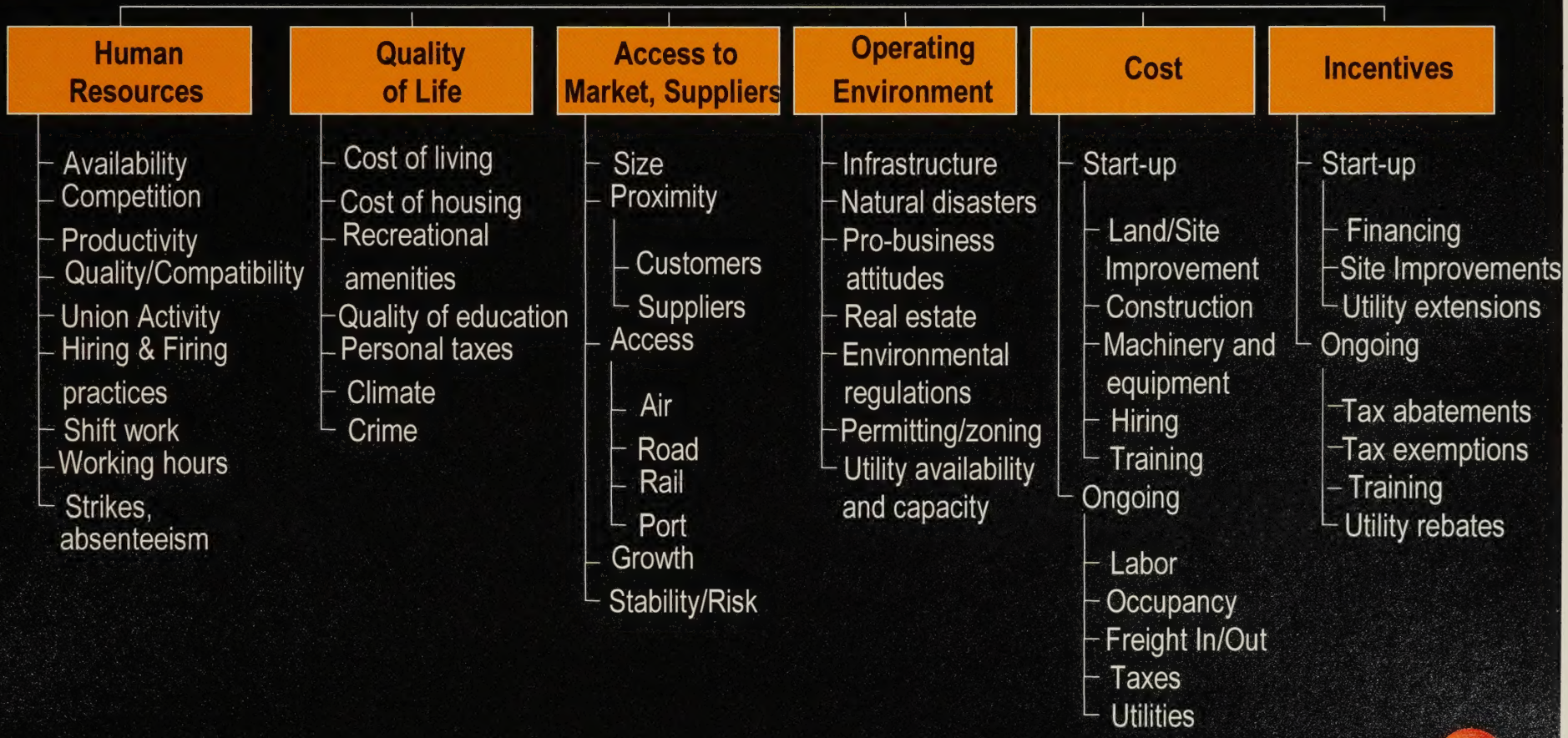
"Efficient and Reliable Transportation Infrastructure is but one factor in the business location decision making process"

Transportation and Business Location (continued)

- Principal Findings from Industry Interviews
  - truck to remain dominant mode of transporting goods to the U.S.
  - growth in trucking most likely to come from shipping smaller quantities as companies survey operating at full capacity
  - fuel consumption / cost will continue to be an issue
  - delays within Niagara Peninsula becoming increasingly problematic; expected to *"only get worse"*
  - directly impact on delivery times and scheduling
  - current "solution" is to schedule off-peak deliveries / shipments
  - difficult to finagle solution when JIT deliveries required / necessary

Transportation and Business Location (continued)

- Business Location Framework / Building Blocks



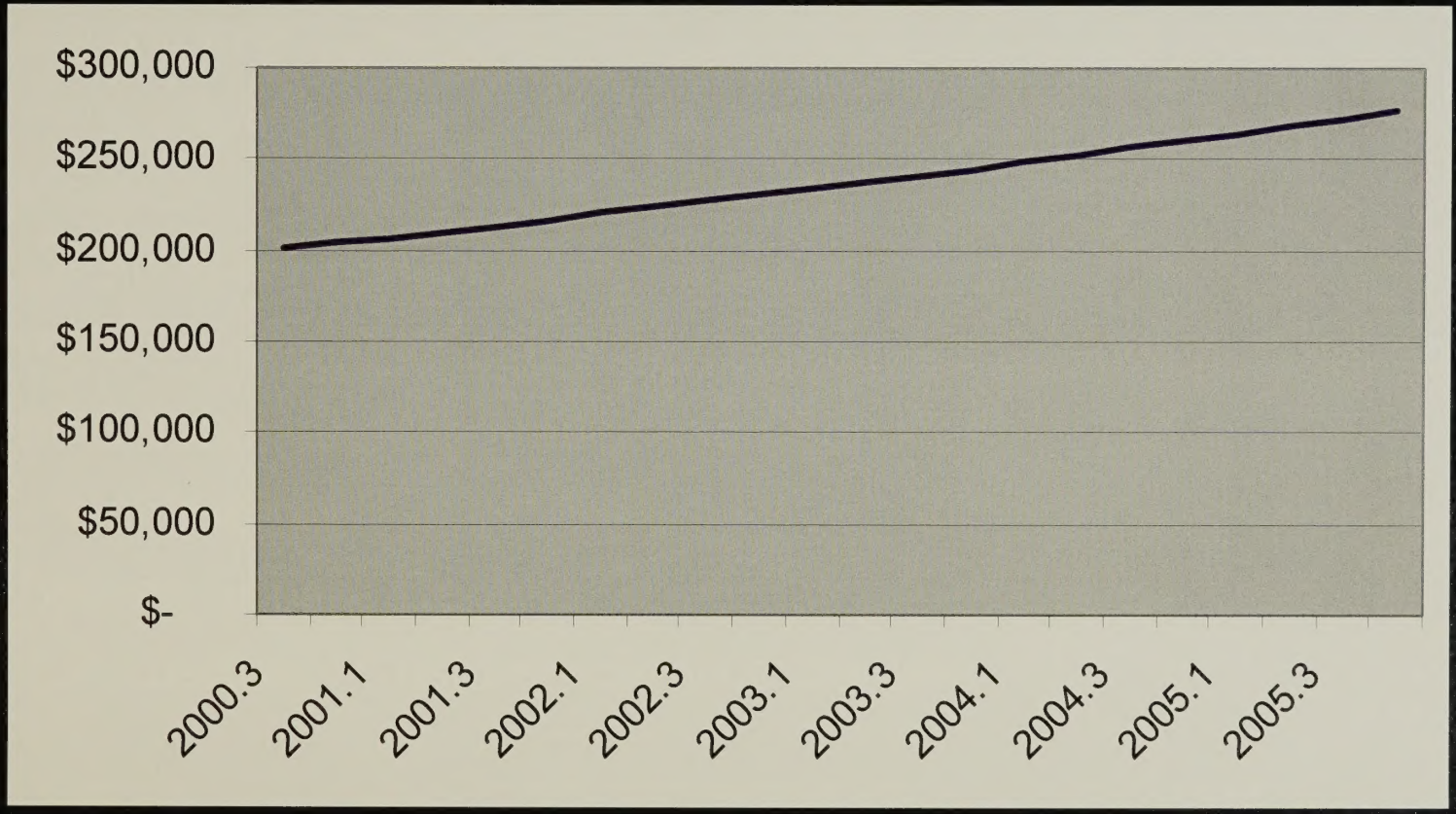
Transportation and Business Location (continued)

- Factors important in selecting cities:

FACTOR	Percentage
Workforce Availability	72
Market Access	65
Cost Structure	59
Hospitable Business Climate	56
Quality of Life	52
Transportation / Infrastructure	23
Telecommunications	9

Transportation and Business Location (continued)

- Canadian International Trade projected to increase by 37% between mid 2000 and 2006



Transportation and Business Location (continued)

- Sectors leading growth projected to be sectors where Ontario felt have a distinct competitive advantage:

  - √ Automotive
  - √ Aerospace
  - √ Plastics
  - √ Computers and Electronic Products
  - √ Biotechnology / Human Health Industries (including pharmaceutical)
  - √ Information and Communication Services
  - √ e-Commerce
  - √ Shared Service Centres
  - √ Call Centres / Customer Service Centres

Key Issues

- Future growth in transportation requirements likely to increase faster than overall GDP growth
- Competitiveness of Southern Ontario region alludes to trade flows originating from this area remaining strong
- While current “issues” with existing road network can be “worked around”, will future economic expansion (i.e., 5-year) impede the efficiency / reliability of the existing network

Niagara Peninsula Transportation Needs Assessment Study -

Land Use and Demographics

Prepared by:
The Planning Partnership

Objectives

To review the relationships among:

- existing local and regional land use policies;
- the opportunities presented by economic circumstances especially as they relate to trade corridors; and
- the consequent potential options for the urban structure

..... from a Provincial, regional and local perspective.

Conclusion #1

There is a strong likelihood that population and employment growth may be higher than currently forecast for both Niagara and Hamilton-Wentworth. The additional growth will come from the ability of the GTA hinterland to offer better transportation accessibility than the GTA.

Forecasting Context

- Early 1990's OGTA Exercise
- Regional Official Plans
- March 2000 OGTA Forecasts
- Greater Golden Horseshoe Forecasts

Implications of Conclusion #1 - Population and Employment Growth

Provincial Perspective

- System unlikely to reach growth levels
- Supported by American experience
- Broader urban system will emerge

Local Perspective

- Potentially higher growth rates
- Additional employment opportunities
- Must complete with other hinterland areas for additional population and employment
- Numerous economic and social factors will determine the competitiveness of the area

Conclusion #2

The planned urban structures of both Niagara and Hamilton-Wentworth provide several key opportunities to take advantage of an enhanced transportation network, without the need for costly extensions to municipal services.

Implications of Conclusion #2 - Opportunities for Transportation

Provincial Perspective

- Trade Corridor Access
- Tender Fruit Lands
- Tourism

Local Perspective

- Many Choices
- Many Opportunities
- Constrained South of Escarpment
- Key Node Near Airport
- Still have to compete with other hinterland areas - Niagara region has existing tourism in it's favour

Conclusion #3

An enhanced transportation network in Niagara/ Hamilton-Wentworth, in the context of the projected congestion in the GTA, has the potential to attract both population and employment growth.

Location and Amount of Growth

- Opportunities will combine servicing/ access and the existing employment community
- Many opportunities exist in a nodal pattern

Conclusion #4

Even with increased population and employment projections, the existing designated employment areas in both Niagara and Hamilton-Wentworth are likely large enough to accommodate the increased growth.

Summary of Conclusions

1. There is a strong likelihood that population and employment growth may be higher than currently forecast for both HW and Niagara. The additional growth will come from the ability of the GTA hinterland to offer better transportation accessibility than the GTA.

2. The planned urban structures of both Niagara and HW provide several key opportunities to take advantage of an enhanced transportation network, without the need to costly extensions to municipal services.

3. An enhanced transportation network in Niagara/HW, in the context of the projected congestion in the GTA, has the potential to attract both population and employment growth.

4. Even with increased population and employment projections, the existing designated employment areas in both Niagara and HW are likely large enough to accommodate increased growth.

Niagara/Hamilton-Wentworth Transportation Needs Assessment Tourism Component

Transportation
Assessment

Objective

To assess the implications of transportation improvements on the growth and sustainability of the tourism industry in the Study Area, the GTA and Southern Ontario.

Transportation
Assessment

Conclusions

- Tourism is the largest and fastest growing industry in the world.
- The Study Area is a recognized world class tourism destination designated for growth
- Niagara/Hamilton-Wentworth an important Provincial tourist travel corridor from the USA to the GTA
- The Study Area comprises 4% of Canadian tourism spending and 15% of Ontario's

Conclusions

- GTA comprises 24% of Ontario tourism spending
- Visitation to the Study Area will double by 2016
- Marketability and growth of tourism industry in Study Area relies on efficient, safe, predictable road access
- Preservation and use of tender fruitlands for wineries and agriculture a key component of the tourism business in the Study Area

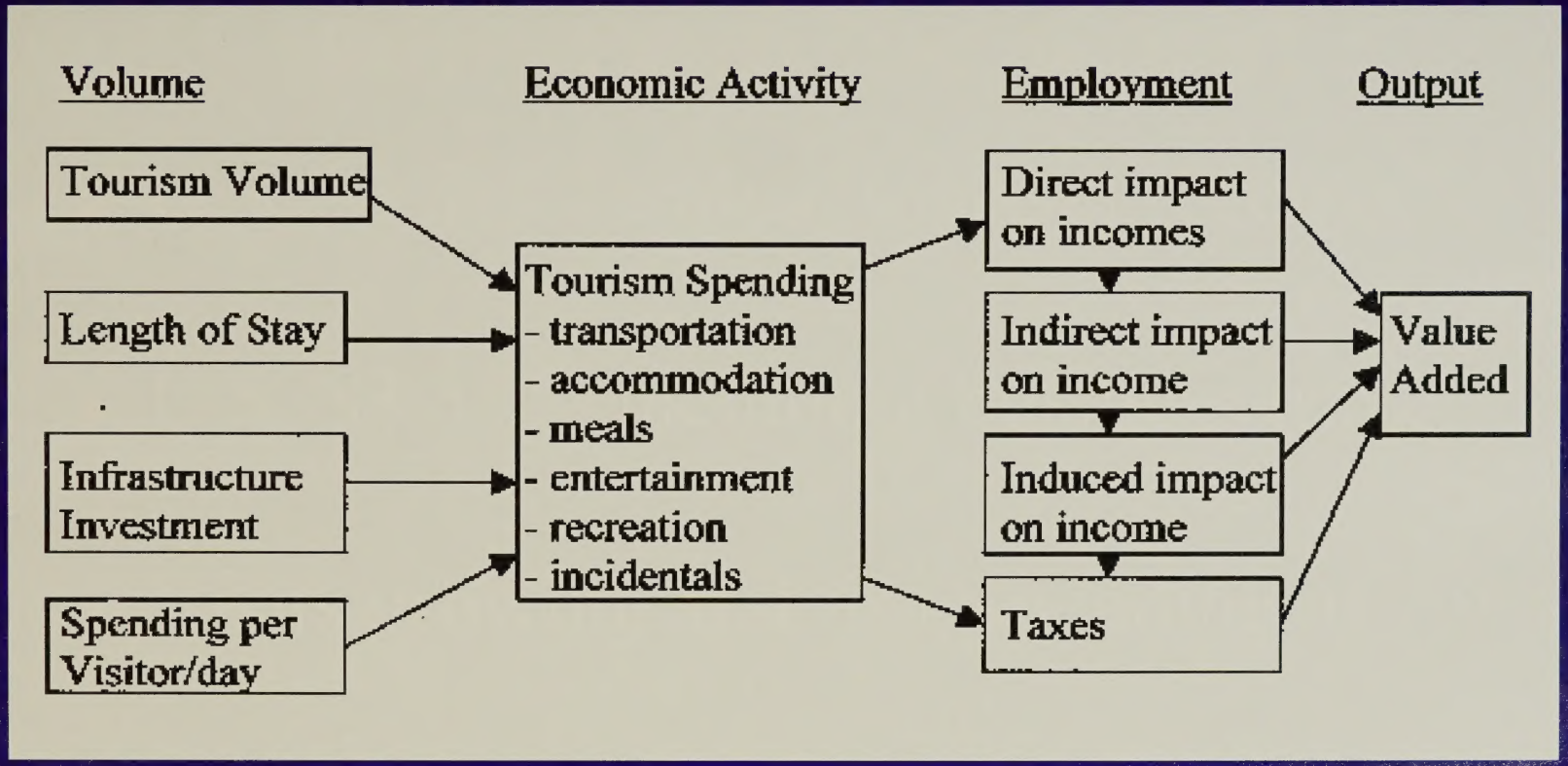
U.S. National Research Council

"As state transportation agencies more closely connect transportation planning and project selection to economic development, and as tourism sustains its economic importance, transportation development and tourism will become even more closely tied. Those states that provide co-ordination in policy, planning and project development will be able to to take advantage of the economic benefits that will occur from increases in tourism."

Finding

Transportation improvements increase accessibility and reduce travel frustrations which produce larger markets, greater visitor trip satisfaction and return visits which in turn leads to further investment, visitation and job creation.

Tourism/Economic Relationship



Tourism - largest and fastest growing industry in the world

- U.S. $1.7 T - annual tourism receipts
- U.S. $3.5 T - including business travel
- Visits growing at 4.5%, spending at 7.9%
- 10% Global employment

Transportation Assessment

Tourism in Canada

- Canada - Cdn $47 B (1998)
- Growing at a faster rate than the Canadian economy
- Ontario - 40%
- Ontario's 5th largest export industry $6.9 B annually

Transportation
Assessment

Study Area Tourism

- Niagara - visitation 14.7 m
  - spending $1.7 B
- Hamilton- Wentworth - spending $.26 B
- Study Area - 4% of Canada Tourism
  - 15% of Ontario Tourism

Transportation
Assessment

Origin and Mode of Travel to Study Area

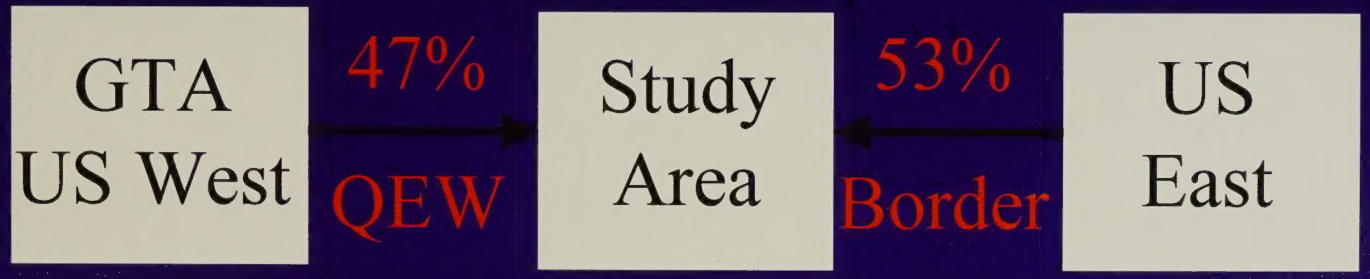
- 66% from U.S.
- 26% from Canada
- 97% by road
- Highway oriented tourism area

Study Area North American Visitation Split

- Border States 40%
- Non - border States 17%
- GTA 16%
- Ontario 21%
- Canada 5%

Visitor Trip Split

- Study Area



- GTA

Transportation
Assessment

Toronto Tourism Visitation

- 16.4 m Total (1998)
- 90.3% via road
- 3.3 m U.S. (20%)

Transportation
Assessment

North America's Largest Population Centres

- New York - Northern New Jersey - Long Island 19.9 M
- Los Angeles-Riverside - Orange County 15.5 M
- Toronto-Hamilton-Niagara-Buffalo-Rochester 8.6 M
- Chicago-Gary-Kenosha 8.6 M

Source: Strategic Projections Inc.

Transportation Assessment

70% of North America's population within 10 hours' drive

Transportation Assessment

Forecast Tourism Visitation

- Household travel spending to grow faster than number of households
- Disposable income to grow faster over next decade
- Niagara forecasting visitation growth to 30 m by 2016
- Toronto forecasting visitation growth to 24 m by 2016

Value Added Output

- $3 B new investment in Niagara by 2016
- 34,000 new jobs in Niagara by 2016
- 20% + increase in visitation to GTA

Transportation
Assessment

Vacation Homes and Adult Lifestyle Development

- 11,300 vacation homes on Lake Erie
- 80% U.S. owned
- Adult lifestyle fastest growing residential market in Niagara
- Both increase tourism market

Transportation Improvements

- Reduce travel time - larger market
- Improve travel safety - visitor satisfaction
- Shape community and business growth patterns

External Access to Markets

- CAH 407
- US Continental
- Interstate 15
- Border Crossing

(Niagara and Windsor/Sarnia

Transportation Assessment

NIAGARA ECONOMIC & TOURISM CORPORATION

Internal Access to Attractions

- CAH 405
- CAH 406
- QEW
- Regional roads

Transportation
Assessment

New Tourism Developments

- Large traffic generators will seek CAH interchange locations
- Tourists discouraged from congested highways and heavy truck corridors
- Niagara's wine industry needs tender fruitland between south shore of Lake Ontario and the Niagara Escarpment.

Conclusions

- Tourism is the largest and fastest growing industry in the world.
- The Study Area is a recognized world class tourism destination designated for growth
- Niagara/Hamilton-Wentworth an important Provincial tourist travel corridor from the USA to the GTA
- The Study Area comprises 4% of Canadian tourism spending and 15% of Ontario's

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